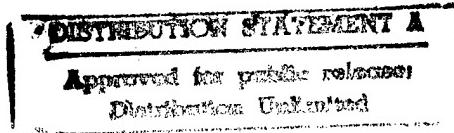


APPENDIX F

SYSTEM SIMULATION COMPUTER RUNS

Volume IV



933702

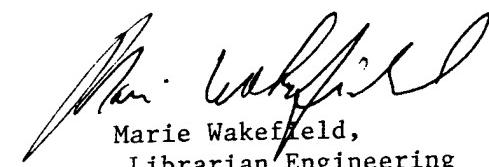


DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO
ATTENTION OF: TR-I Library

17 Sep 1997

Based on SOW, these Energy Studies are unclassified/unlimited.
Distribution A. Approved for public release.



Marie Wakefield,
Librarian Engineering

Building 318

Trace Input File

19971017 078

933702

CONTENTS OF : E:\CB318.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 318
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7
14 20/2/1/DINING ROOM/209/1/1/.8/.45/10.7
15 20/3/1/BEDROOM/248/1/1/.8/.45/10.8
16 20/4/1/BEDROOM/116/1/1/0//10.8
17 20/5/1/STUDY/228/1/1/0//8.5
18 20/6/2/KITCHEN/175/1/1/.8/.45/10.7
19 20/7/2/LAUNDRY/22/1/1/.8/.45/10.7
20 20/8/2/BEDROOM/157/1/1/.8/.45/10.8
21 20/9/2/BATH/41/1/1/0//10.8
22 20/10/2/BATH/47/1/1/0//8.5
23 21/M///CBLQTX///CBLQTX
24 22/3/1/NO/82/1//171
25 22/4/1/YES///171
26 22/5/1/YES///159
27 22/8/1/NO/66/1//171
28 22/9/1/YES///171
29 22/10/1/YES///159
30 24/1/1/19/9.75//167/20
31 24/1/2/13/9.75//167/110
32 24/2/1/14/9.75//167/110
33 24/3/1/19/9.8//167/20
34 24/3/2/14.7/9.8//167/110
35 24/4/1/13.7/9.8//167/110
36 24/4/2/8.7/9.8//167/200
37 24/5/1/14.7/7.5//167/20
38 24/5/2/13.7/7.5//167/110
39 24/5/3/3/7.5//167/290
40 24/6/1/14/9.75//167/110
41 24/6/2/9.3/9.75//167/200
42 24/7/1/4.3/9.75//167/110
43 24/7/2/4.3/9.75//167/200
44 24/8/1/11/9.8//167/110
45 24/8/2/4.3/9.8//167/200
46 24/9/1/5.3/9.8//167/200
47 24/10/1/5/7.5//167/110
48 25/1/1/5.5/2/2/.55/.57
49 25/1/2/5.5/2/1/.55/.57
50 25/2/1/8/6/1/.55/.57
51 25/3/1/5.5/2.25/3/.55/.57
52 25/3/2/5.5/2/1/.81/.64
53 25/4/1/5.5/2.25/1/.55/.57
54 25/4/2/5.5/2.25/1/.55/.57
55 25/5/1/3.5/1.25/2/.81/.64
56 25/6/1/4/2.25/1/.55/.57
57 25/6/2/4/2.25/1/.55/.57
58 25/7/2/5.5/1.75/1/.55/.57

PRINT QUALITY INSPECTED 2

CONTENTS OF : E:\CB318.TM

LINE # -----
59 25/8/1/5.5/2.25/1/.55/.57
60 25/8/2/5.5/1.75/1/.55/.57
61 25/9/1/5.5/1.5/1/.55/.57
62 25/10/1/3/1.25/1/.81/.64
63 26/M/CBLQP/CBLQL//OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
64 27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
65 29/1///.32/CFM-SF/.32/CFM-SF
66 29/2///.32/CFM-SF/.32/CFM-SF
67 29/3///.32/CFM-SF/.32/CFM-SF
68 29/4///.32/CFM-SF/.32/CFM-SF
69 29/5///.32/CFM-SF/.32/CFM-SF
70 29/6///.32/CFM-SF
71 29/7///.32/CFM-SF
72 29/8///.32/CFM-SF
73 29/9///.32/CFM-SF
74 29/10///.32/CFM-SF
75 SYSTEM - 1
76 39/1/BASE BUILDING
77 40/1/PTAC
78 41/1/1/1
79 42/1/.2
80 45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
81 40/2/RAD
82 41/2/1/2
83 45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
84 EQUIPMENT - 1
85 59/1/CARLISLE///BASE BUILDING
86 60/1/1/PKPLANT/1/1
87 62/1/EQ1161/8
88 65/1/1//2/2
89 67/1/EQ2102/1
90 69/1/EQ4003
91 LOAD - 2
92 19/2/WALL & ROOF INSULATION
93 20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7
94 20/2/1/DINING ROOM/209/1/1/.8/.45/10.7
95 20/3/1/BEDROOM/248/1/1/.8/.45/10.8
96 20/4/1/BEDROOM/116/1/1//10.8
97 20/5/1/STUDY/228/1/1/0//8.5
98 20/6/2/KITCHEN/175/1/1/.8/.45/10.7
99 20/7/2/LAUNDRY/22/1/1/.8/.45/10.7
100 20/8/2/BEDROOM/157/1/1/.8/.45/10.8
101 20/9/2/BATH/41/1/1/0//10.8
102 20/10/2/BATH/47/1/1/0//8.5
103 21/M///CBLQTX///CBLQTX
104 22/3/1/N0/82/1//191
105 22/4/1/YES///191
106 22/5/1/YES///125
107 22/8/1/N0/66/1//191
108 22/9/1/YES///191
109 22/10/1/YES///125
110 24/1/1/19/9.75//126/20
111 24/1/2/13/9.75//126/110
112 24/2/1/14/9.75//126/110
113 24/3/1/19/9.8//126/20
114 24/3/2/14.7/9.8//126/110
115 24/4/1/13.7/9.8//126/110
116 24/4/2/8.7/9.8//126/200

CONTENTS OF : E:\CB318.TM

LINE # -----
117 24/5/1/14.7/7.5//126/20
118 24/5/2/13.7/7.5//126/110
119 24/5/3/3/7.5//126/290
120 24/6/1/14/9.75//126/110
121 24/6/2/9.3/9.75//126/200
122 24/7/1/4.3/9.75//126/110
123 24/7/2/4.3/9.75//126/200
124 24/8/1/11/9.8//126/110
125 24/8/2/4.3/9.8//126/200
126 24/9/1/5.3/9.8//126/200
127 24/10/1/5/7.5//126/110
128 25/1/1/5.5/2/2/.55/.57
129 25/1/2/5.5/2/1/.55/.57
130 25/2/1/8/6/1/.55/.57
131 25/3/1/5.5/2.25/3/.55/.57
132 25/3/2/5.5/2/1/.81/.64
133 25/4/1/5.5/2.25/1/.55/.57
134 25/4/2/5.5/2.25/1/.55/.57
135 25/5/1/3.5/1.25/2/.81/.64
136 25/6/1/4/2.25/1/.55/.57
137 25/6/2/4/2.25/1/.55/.57
138 25/7/2/5.5/1.75/1/.55/.57
139 25/8/1/5.5/2.25/1/.55/.57
140 25/8/2/5.5/1.75/1/.55/.57
141 25/9/1/5.5/1.5/1/.55/.57
142 25/10/1/3/1.25/1/.81/.64
143 26/M/CBLQP/CBLQL/0FF//0FF/CBLQCLG/0FF/0FF/0FF/0FF
144 27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
145 29/1/////.28/CFM-SF/.28/CFM-SF
146 29/2/////.28/CFM-SF/.28/CFM-SF
147 29/3/////.28/CFM-SF/.28/CFM-SF
148 29/4/////.28/CFM-SF/.28/CFM-SF
149 29/5/////.28/CFM-SF/.28/CFM-SF
150 29/6/////.28/CFM-SF
151 29/7/////.28/CFM-SF
152 29/8/////.28/CFM-SF
153 29/9/////.28/CFM-SF
154 29/10/////.28/CFM-SF
155 SYSTEM - 2
156 39/2/WALL & ROOF INSULATION
157 40/1/PTAC
158 41/1/1/1
159 42/1/.2
160 45/1/CBLQCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
161 40/2/RAD
162 41/2/1/2
163 45/2/0FF/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
164 EQUIPMENT - 2
165 59/2/CARLISLE///WALL & ROOF INSULATION
166 60/1/1/PKPLANT/1/1
167 62/1/EQ1161/8.
168 65/1/1//2/2
169 67/1/EQ2102/1
170 69/1/EQ4003
171 LOAD - 3
172 19/3/WEATHERSTRIP & CAULKING
173 20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7
174 20/2/1/DINING ROOM/209/1/1/.8/.45/10.7

CONTENTS OF : E:\CB318.TM

LINE # -----
175 20/3/1/BEDROOM/248/1/1/.8/.45/10.8
176 20/4/1/BEDROOM/116/1/1/0//10.8
177 20/5/1/STUDY/228/1/1/0//8.5
178 20/6/2/KITCHEN/175/1/1/.8/.45/10.7
179 20/7/2/LAUNDRY/22/1/1/.8/.45/10.7
180 20/8/2/BEDROOM/157/1/1/.8/.45/10.8
181 20/9/2/BATH/41/1/1/0//10.8
182 20/10/2/BATH/47/1/1/0//8.5
183 21/M///CBLQTX///CBLQTX
184 22/3/1/NO/82/1//171
185 22/4/1/YES///171
186 22/5/1/YES///159
187 22/8/1/NO/66/1//171
188 22/9/1/YES///171
189 22/10/1/YES///159
190 24/1/1/19/9.75//167/20
191 24/1/2/13/9.75//167/110
192 24/2/1/14/9.75//167/110
193 24/3/1/19/9.8//167/20
194 24/3/2/14.7/9.8//167/110
195 24/4/1/13.7/9.8//167/110
196 24/4/2/8.7/9.8//167/200
197 24/5/1/14.7/7.5//167/20
198 24/5/2/13.7/7.5//167/110
199 24/5/3/3/7.5//167/290
200 24/6/1/14/9.75//167/110
201 24/6/2/9.3/9.75//167/200
202 24/7/1/4.3/9.75//167/110
203 24/7/2/4.3/9.75//167/200
204 24/8/1/11/9.8//167/110
205 24/8/2/4.3/9.8//167/200
206 24/9/1/5.3/9.8//167/200
207 24/10/1/5/7.5//167/110
208 25/1/1/5.5/2/2/.55/.57
209 25/1/2/5.5/2/1/.55/.57
210 25/2/1/8/6/1/.55/.57
211 25/3/1/5.5/2.25/3/.55/.57
212 25/3/2/5.5/2/1/.81/.64
213 25/4/1/5.5/2.25/1/.55/.57
214 25/4/2/5.5/2.25/1/.55/.57
215 25/5/1/3.5/1.25/2/.81/.64
216 25/6/1/4/2.25/1/.55/.57
217 25/6/2/4/2.25/1/.55/.57
218 25/7/2/5.5/1.75/1/.55/.57
219 25/8/1/5.5/2.25/1/.55/.57
220 25/8/2/5.5/1.75/1/.55/.57
221 25/9/1/5.5/1.5/1/.55/.57
222 25/10/1/3/1.25/1/.81/.64
223 26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
224 27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
225 29/1///.27/CFM-SF/.27/CFM-SF
226 29/2///.27/CFM-SF/.27/CFM-SF
227 29/3///.27/CFM-SF/.27/CFM-SF
228 29/4///.27/CFM-SF/.27/CFM-SF
229 29/5///.27/CFM-SF/.27/CFM-SF
230 29/6////////.27/CFM-SF
231 29/7////////.27/CFM-SF
232 29/8////////.27/CFM-SF

CONTENTS OF : E:\CB318.TM

LINE # -----
233 29/9////////.27/CFM-SF
234 29/10////////.27/CFM-SF
235 SYSTEM - 3
236 39/3/WEATHERSTRIP & CAULKING
237 40/1/PTAC
238 41/1/1/1
239 42/1/.2
240 45/1/CBLQCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
241 40/2/RAD
242 41/2/1/2
243 45/2/0FF/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
244 EQUIPMENT - 3
245 59/3/CARLISLE///WEATHERSTRIP & CAULKING
246 60/1/1/PKPLANT/1/1
247 62/1/EQ1161/8
248 65/1/1//2/2
249 67/1/EQ2102/1
250 69/1/EQ4003
251 LOAD - 4
252 19/4/COMBINED ECOS
253 20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7
254 20/2/1/DINING ROOM/209/1/1/.8/.45/10.7
255 20/3/1/BEDROOM/248/1/1/.8/.45/10.8
256 20/4/1/BEDROOM/116/1/1/0//10.8
257 20/5/1/STUDY/228/1/1/0//8.5
258 20/6/2/KITCHEN/175/1/1/.8/.45/10.7
259 20/7/2/LAUNDRY/22/1/1/.8/.45/10.7
260 20/8/2/BEDROOM/157/1/1/.8/.45/10.8
261 20/9/2/BATH/41/1/1/0//10.8
262 20/10/2/BATH/47/1/1/0//8.5
263 21/M///CBLQTX///CBLQTX
264 22/3/1/NO/82/1//191
265 22/4/1/YES///191
266 22/5/1/YES///125
267 22/8/1/NO/66/1//191
268 22/9/1/YES///191
269 22/10/1/YES///125
270 24/1/1/19/9.75//126/20
271 24/1/2/13/9.75//126/110
272 24/2/1/14/9.75//126/110
273 24/3/1/19/9.8//126/20
274 24/3/2/14.7/9.8//126/110
275 24/4/1/13.7/9.8//126/110
276 24/4/2/8.7/9.8//126/200
277 24/5/1/14.7/7.5//126/20
278 24/5/2/13.7/7.5//126/110
279 24/5/3/3/7.5//126/290
280 24/6/1/14/9.75//126/110
281 24/6/2/9.3/9.75//126/200
282 24/7/1/4.3/9.75//126/110
283 24/7/2/4.3/9.75//126/200
284 24/8/1/11/9.8//126/110
285 24/8/2/4.3/9.8//126/200
286 24/9/1/5.3/9.8//126/200
287 24/10/1/5/7.5//126/110
288 25/1/1/5.5/2/2/.55/.57
289 25/1/2/5.5/2/1/.55/.57
290 25/2/1/8/6/1/.55/.57

CONTENTS OF : E:\CB318.TM

LINE # -----
291 25/3/1/5.5/2.25/3/.55/.57
292 25/3/2/5.5/2/1/.81/.64
293 25/4/1/5.5/2.25/1/.55/.57
294 25/4/2/5.5/2.25/1/.55/.57
295 25/5/1/3.5/1.25/2/.81/.64
296 25/6/1/4/2.25/1/.55/.57
297 25/6/2/4/2.25/1/.55/.57
298 25/7/2/5.5/1.75/1/.55/.57
299 25/8/1/5.5/2.25/1/.55/.57
300 25/8/2/5.5/1.75/1/.55/.57
301 25/9/1/5.5/1.5/1/.55/.57
302 25/10/1/3/1.25/1/.81/.64
303 26/M/CBLQP/CBLQL//OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
304 27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
305 29/1/////.22/CFM-SF/.22/CFM-SF
306 29/2/////.22/CFM-SF/.22/CFM-SF
307 29/3/////.22/CFM-SF/.22/CFM-SF
308 29/4/////.22/CFM-SF/.22/CFM-SF
309 29/5/////.22/CFM-SF/.22/CFM-SF
310 29/6////////.22/CFM-SF
311 29/7////////.22/CFM-SF
312 29/8////////.22/CFM-SF
313 29/9////////.22/CFM-SF
314 29/10////////.22/CFM-SF
315 SYSTEM - 4
316 39/4/COMBINED ECOS
317 40/1/PTAC
318 41/1/1/1
319 42/1/.2
320 45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
321 40/2/RAD
322 41/2/1/2
323 45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
324 EQUIPMENT - 4
325 59/4/CARLISLE///COMBINED ECOS
326 60/1/1/PKPLANT/1/1
327 62/1/EQ1161/8
328 65/1/1//2/2
329 67/1/EQ2102/1
330 69/1/EQ4003

Building 318

Trace Output File

933702

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 318

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:52:36 1/20/94
Dataset Name: CB318 .TM

AIRFLOW - ALTERNATIVE 1

BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
1 PTAC		0	1,501	1,501	1,895	395	0	0
2 RAD		0	0	0	0	571	0	0
Totals		0	1,501	1,501	1,895	966	0	0

CAPACITY - ALTERNATIVE 1

BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		3.4	0.0	0.0	3.4	-57,343	0	0	0	0	0	-57,343
2 RAD		0.0	0.0	0.0	0.0	-80,370	0	0	0	0	0	-80,370
Totals		3.4	0.0	0.0	3.4	-137,714	0	0	0	0	0	-137,714

The building peaked at hour 13 month 7 with a capacity of 3.3 tons

ENGINEERING CHECKS - ALTERNATIVE 1

BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	1.42	441.5	310.4	38.66	1.42	-54.35	1,055	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-53.69	1,497	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 7/13						*	Mo/Hr: 7/13			Mo/Hr: 13/ 1		
Outside Air ==> OADB/WB/HR: 89/ 74/105.0						*	OADB: 89			OADB: 4		
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	4,708	171		4,878	11.96	*	4,773	15.21	*	-3,843	-4,055	7.19
Glass Solar	7,164	0		7,164	17.57	*	7,115	22.67	*	0	0	0.00
Glass Cond	1,004	0		1,004	2.46	*	1,017	3.24	*	-6,206	-6,206	11.00
Wall Cond	10,560	610		11,170	27.39	*	10,443	33.27	*	-17,668	-18,650	33.06
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	15,146			15,146	37.14	*	6,010	19.15	*	-27,497	-27,497	48.75
Sub Total==>	38,583	781		39,364	96.51	*	29,358	93.53	*	-55,213	-56,408	100.00
Internal Loads						*			*			
Lights	494	0		494	1.21	*	625	1.99	*	0	0	0.00
People	715			715	1.75	*	407	1.30	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	1,210	0	0	1,210	2.97	*	1,032	3.29	*	0	0	0.00
Ceiling Load	547	-547		0	0.00	*	1,000	3.18	*	-942	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				213	0.52	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	40,339	234	0	40,787	100.00	*	31,390	100.00	*	-56,155	-56,408	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Gross Total Glass (sf)	Areas (%)
Main Clg	3.4	40.8	31.3	1,501 75.8 63.1 68.5	55.7 53.9 60.8	Part	1,055	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Roof	426	0 0
Totals	3.4	40.8				Wall	1,234	163 13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating Infil	Clg % OA 395	0.0	Type	Clg	Htg
Main Htg	-57.3	1,501	67.3	102.4	Infil	0	0	Clg Cfm/Sqft	1.42	SADB	55.8	102.4
Aux Htg	0.0	0	0.0	0.0	Supply	1,501	1,501	Clg Cfm/Ton	441.48	Plenum	76.4	66.3
Preheat	-0.0	1,501	67.1	55.6	Mincfm	0	0	Clg Sqft/Ton	310.39	Return	75.7	67.1
Reheat	0.0	0	0.0	0.0	Return	1,501	1,501	Clg Btuh/Sqft	38.66	Ret/OA	75.7	67.1
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	3	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-57.3				Auxil	0	0	Htg Cfm/SqFt	1.42	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-54.35	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

COOLING COIL PEAK						CLG SPACE PEAK			HEATING COIL PEAK		
Peaked at Time ==>	Mo/Hr: 0 / 0		*	Mo/Hr: 0 / 0	*	Mo/Hr: 13 / 1					
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0		*	OADB: 0	*	OADB: 4					
			*			*					
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak (Btuh)	Coil Peak (Btuh)	Percent (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-4,681	-5,047 6.28
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492 10.57
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,592	-27,068 33.68
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-39,763	-39,763 49.48
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-78,528	-80,370 100.00
Internal Loads					*				*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,672	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0 0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0 0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0 0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0 0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0 0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-84,199	-80,370 100.00

COOLING COIL SELECTION									AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)				
Main Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0	1,497					
Aux Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0	0					
Opt Vent	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0	580	0	0			
Totals	0.0	0.0			1,784	224	13				

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg	
Main Htg	-80.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	571	Clg Cfm/Ton	0.00	Plenum	0.0	63.1
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-80.4	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
				Auxil	0	0	Htg Btuh/SqFt	-53.69	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Windo		Wintr Windo					
			Roof	Windo	Wall	Ceil.								
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63		
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04		
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93		
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63		
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04		
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93		
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91		
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	17.6	6.32		
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	38.4	11.11		
8	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.549	17.7	6.56		
9	BATH	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	25.2	8.59		
10	BATH	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	20.9	7.62		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.103	0.566	0.579	0.272	0.549	19.7	6.99		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.137	0.577	0.591	0.272	0.549	19.4	6.94		
Building		0.000	0.000	0.000	0.000	0.142	0.579	0.593	0.272	0.549	19.3	6.93		

BUILDING AREAS - ALTERNATIVE 1

BASE BUILDING

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor Flr	Area/Rm (sqft)	Floor	Total	Exposed	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
				Duplicate	Floor Area (sqft)	Partition Area (sqft)				(sqft)	(%)	(sqft)
1	LIVING ROOM	1	1	254	254	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	47	4	10	34
Zone	2 Total/Ave.			442	0	0	0	0	154	62	11	489
System	2 Total/Ave.			1,497	0	0	0	0	580	224	13	1,560
Building				2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 1

BASE BUILDING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.142 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.312 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.269 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 10.87 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 21.36 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	8	103	-6,886	12	584	75.0	0	0	0.0	0	0
5 - 10	0.3	9	120	-13,771	12	575	150.1	0	0	0.0	0	0
10 - 15	0.5	8	101	-20,657	17	792	225.1	0	0	0.0	0	0
15 - 20	0.7	5	69	-27,543	18	859	300.1	42	1,530	0.0	0	0
20 - 25	0.8	7	84	-34,428	20	928	375.1	0	0	0.0	0	0
25 - 30	1.0	18	225	-41,314	11	544	450.2	0	0	0.0	0	0
30 - 35	1.2	9	112	-48,200	10	457	525.2	0	0	0.0	0	0
35 - 40	1.4	12	150	-55,086	0	0	600.2	0	0	0.0	0	0
40 - 45	1.5	11	140	-61,971	0	0	675.2	0	0	0.0	0	0
45 - 50	1.7	4	50	-68,857	0	0	750.3	21	765	0.0	0	0
50 - 55	1.9	4	51	-75,743	0	0	825.3	0	0	0.0	0	0
55 - 60	2.0	0	0	-82,628	0	0	900.3	0	0	0.0	0	0
60 - 65	2.2	0	0	-89,514	0	0	975.4	0	0	0.0	0	0
65 - 70	2.4	0	0	-96,400	0	0	1,050.4	0	0	0.0	0	0
70 - 75	2.5	0	0	-103,285	0	0	1,125.4	0	0	0.0	0	0
75 - 80	2.7	0	0	-110,171	0	0	1,200.4	0	0	0.0	0	0
80 - 85	2.9	2	31	-117,057	0	0	1,275.5	0	0	0.0	0	0
85 - 90	3.1	0	0	-123,942	0	0	1,350.5	0	0	0.0	0	0
90 - 95	3.2	0	0	-130,828	0	0	1,425.5	0	0	0.0	0	0
95 - 100	3.4	2	31	-137,714	0	0	1,500.6	38	1,377	0.0	0	0
Hours Off	0.0	0	7,493	0	0	4,021	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number
Range (F)	1 1 2

Max. Temp.	86.0	104.1	105.9			
Mo./Hr.	7	14	7	19	7	20
Day Type	1	1	1			

	Number of Hours		
Above 100	0	0	154
95 - 100	0	465	706
90 - 95	0	1,092	1,234
85 - 90	0	923	992
80 - 85	62	913	472
75 - 80	2,380	279	114
70 - 75	864	0	318
65 - 70	383	5,088	4,770
60 - 65	778	0	0
55 - 60	715	0	0
50 - 55	757	0	0
Below 50	2,821	0	0

Min. Temp.	30.3	67.9	67.9			
Mo./Hr.	2	9	3	19	1	9
Day Type	4	1	1			

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On-Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	339	1	253	0
Feb	306	1	249	0
March	347	1	163	0
April	326	1	70	0
May	478	6	0	0
June	906	7	0	0
July	1,339	7	0	0
Aug	912	7	0	0
Sept	449	6	0	0
Oct	343	1	55	0
Nov	327	1	115	0
Dec	335	1	213	0
Total	6,407	7	1,118	0

Building Energy Consumption = 52,394 (Btu/Sq Ft/Year)
Source Energy Consumption = 84,143 (Btu/Sq Ft/Year)

Floor Area = 2,552 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1 BASE BUILDING

EQUIPMENT ENERGY CONSUMPTION

Trane Air Conditioning Economics

V 600
PAGE 11

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1

BASE BUILDING

ELEC 1 1 1 1 0 0 0 0 0 1 1 1 9
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 6.8 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.4	79.47
Sub Total			5.4	79.47
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.1	1.88
Sub Total			0.1	1.88
Sub Total			0.0	0.00

Miscellaneous

Lights	1.3	18.65
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	1.3	18.65
Grand Total	6.8	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 318

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 14: 3:59 1/20/94
Dataset Name: CB318 .TM

AIRFLOW - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	826	826	1,172	345	0	0
2 RAD		0	0	0	0	500	0	0
Totals		0	826	826	1,172	845	0	0

CAPACITY - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		2.1	0.0	0.0	2.1	-34,308	0	0	0	0	0	0	-34,308
2 RAD		0.0	0.0	0.0	0.0	-48,752	0	0	0	0	0	0	-48,752
Totals		2.1	0.0	0.0	2.1	-83,060	0	0	0	0	0	0	-83,060

The building peaked at hour 14 month 7 with a capacity of 2.0 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				CFM/Sq Ft	CFM/Ton	Sq Ft /Ton	BtuH/Sq Ft	CFM/Sq Ft	BtuH/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	0.78	395.8	505.4	23.75	0.78	-32.52	1,055	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-32.57	1,497	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==> Mo/Hr: 7/14 *						Mo/Hr: 7/16 *			Mo/Hr: 13/1		
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 *						OADB: 91 *			OADB: 4 *		
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%) *	Space Sensible (Btuh)	Percent Of Tot (%) *	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)	
Skylite Solr	0	0		0	0.00 *	0	0.00 *	0	0	0.00	
Skylite Cond	0	0		0	0.00 *	0	0.00 *	0	0	0.00	
Roof Cond	678	100		778	3.11 *	738	4.20 *	-672	-811	2.38	
Glass Solar	6.969	0		6.969	27.82 *	6,595	37.54 *	0	0	0.00	
Glass Cond	1,080	0		1,080	4.31 *	1,135	6.46 *	-6,206	-6,206	18.21	
Wall Cond	1,678	96		1,774	7.08 *	1,573	8.95 *	-2,849	-3,010	8.83	
Partition	0			0	0.00 *	0	0.00 *	0	0	0.00	
Exposed Floor	0			0	0.00 *	0	0.00 *	0	0	0.00	
Infiltration	13,134			13,134	52.43 *	5,552	31.60 *	-24,060	-24,060	70.58	
Sub Total==>	23,539	197		23,736	94.75 *	15,594	88.76 *	-33,786	-34,086	100.00	
Internal Loads					*		*				
Lights	486	0		486	1.94 *	1,192	6.79 *	0	0	0.00	
People	712			712	2.84 *	484	2.76 *	0	0	0.00	
Misc	0	0	0	0	0.00 *	0	0.00 *	0	0	0.00	
Sub Total==>	1,198	0	0	1,198	4.78 *	1,677	9.54 *	0	0	0.00	
Ceiling Load	160	-160		0	0.00 *	299	1.70 *	-292	0	0.00	
Outside Air	0	0	0	0	0.00 *	0	0.00 *	0	0	0.00	
Sup. Fan Heat				118	0.47 *		0.00 *		0	0.00	
Ret. Fan Heat		0		0	0.00 *		0.00 *		0	0.00	
Duct Heat Pkup		0		0	0.00 *		0.00 *		0	0.00	
OV/UNDR Sizing	0			0	0.00 *	0	0.00 *	0	0	0.00	
Exhaust Heat		0	0	0	0.00 *		0.00 *		0	0.00	
Terminal Bypass		0	0	0	0.00 *		0.00 *		0	0.00	
Grand Total==>	24,897	37	0	25,051	100.00 *	17,570	100.00 *	-34,078	-34,086	100.00	

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Areas
Main Clg	2.1	25.1	17.1	826	Gross Total 1,055
Aux Clg	0.0	0.0	0.0	0	Floor Part 0
Opt Vent	0.0	0.0	0.0	0	ExFlr 0
Totals	2.1	25.1			Roof 426 0 0
					Wall 1,234 163 13

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-34.3	826	67.7	105.9	Infil	345	345	0.78	SADB	55.5	105.9
Aux Htg	0.0	0	0.0	0.0	Supply	826	826	395.78	Plenum	75.4	67.4
Preheat	-0.0	826	67.7	55.3	Mincfm	0	0	505.36	Return	75.2	67.7
Reheat	0.0	0	0.0	0.0	Return	826	826	23.75	Ret/OA	75.2	67.7
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0.0	No. People	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0.78	Htg % OA	Fn MtrTD	0.0 0.0
Total	-34.3				Auxil	0	0	-32.52	Htg Cfm/SqFt	Fn BldTD	0.0 0.0
								0.1	Htg Btuh/SqFt	Fn Frict	0.1 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****					CLG SPACE PEAK *****					HEATING COIL PEAK *****		
Peaked at Time ==> Mo/Hr: 0/ 0					* Mo/Hr: 0/ 0					* Mo/Hr: 13/ 1		
Outside Air ==> DADB/WB/HR: 0/ 0/ 0.0					* DADB: 0					* DADB: 4		
Envelope Loads	Sens. + Lat. (Btu/h)	Space Sensible (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak (Btu/h)	Coil Peak (Btu/h)	Percent Of Tot (%)
Skylite Solr	0	0			0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0			0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0			0	0.00	*	0	0.00	*	-840	-1,086
Glass Solar	0	0			0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0			0	0.00	*	0	0.00	*	-8,492	-8,492
Wall Cond	0	0			0	0.00	*	0	0.00	*	-4,127	-4,381
Partition	0				0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0				0	0.00	*	0	0.00	*	0	0.00
Infiltration	0				0	0.00	*	0	0.00	*	-34,793	-34,793
Sub Total ==>	0	0			0	0.00	*	0	0.00	*	-48,251	-48,752
Internal Loads							*			*		100.00
Lights	0	0			0	0.00	*	0	0.00	*	0	0.00
People	0				0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0		0	0.00	*	0	0.00	*	0	0.00
Sub Total ==>	0	0	0		0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0			0	0.00	*	0	0.00	*	-1,305	0.00
Outside Air	0	0	0		0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat					0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0			0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0			0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0				0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0		0	0.00	*			0.00	*	0.00
Terminal Bypass		0	0		0	0.00	*			0.00	*	0.00
Grand Total ==>	0	0	0		0	0.00	*	0	0.00	*	-49,556	-48,752
												100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	Roof	580	0
Totals	0.0	0.0			Wall	1,784	224 13

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-48.8	0	0.0	Infil	0	500	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	66.7
Preheat	0.0	0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-48.8			Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
						0	Htg Btuh/SqFt	-32.57	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Roof		Wintr Windo					
			ExFlr				Windo		Wall	Ceil.				
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71		
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31		
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40		
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71		
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31		
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40		
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20		
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	18.8	6.56		
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	41.8	11.78		
8	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.549	18.8	6.78		
9	BATH	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	26.9	8.93		
10	BATH	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	22.9	8.03		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.028	0.566	0.579	0.044	0.549	21.1	7.28		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.029	0.577	0.591	0.044	0.549	20.8	7.22		
Building		0.000	0.000	0.000	0.000	0.030	0.579	0.593	0.044	0.549	20.7	7.21		

BUILDING AREAS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING AREAS -----

Room Number	Description	Floor Dupl	Floor	Total	Exposed		Skylight Area /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (\$)	Net Wall Area (sqft)	
			Duplicate Flr	Rm	(sqft)	Floor Area (sqft)	Partition Area (sqft)	(sqft)	(sqft)	(sqft)	(sqft)	
1	LIVING ROOM	1	1	254	254	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	47	4	10	34
Zone	2 Total/Ave.			442	0	0	0	0	154	62	11	489
System	2 Total/Ave.			1,497	0	0	0	0	580	224	13	1,560
Building				2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.030 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.113 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.51 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.40 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.1	5	50	-4,153	13	617	41.3	0	0	0.0	0	0
5 - 10	0.2	8	84	-8,306	13	598	82.6	0	0	0.0	0	0
10 - 15	0.3	5	50	-12,459	19	895	123.9	0	0	0.0	0	0
15 - 20	0.4	4	43	-16,612	22	1,006	165.2	42	1,530	0.0	0	0
20 - 25	0.5	13	136	-20,765	16	724	206.6	0	0	0.0	0	0
25 - 30	0.6	12	125	-24,918	12	577	247.9	0	0	0.0	0	0
30 - 35	0.7	15	156	-29,071	5	210	289.2	0	0	0.0	0	0
35 - 40	0.8	8	86	-33,224	0	0	330.5	0	0	0.0	0	0
40 - 45	0.9	12	128	-37,377	0	0	371.8	0	0	0.0	0	0
45 - 50	1.0	8	85	-41,530	0	0	413.1	21	765	0.0	0	0
50 - 55	1.1	2	20	-45,683	0	0	454.4	0	0	0.0	0	0
55 - 60	1.3	0	0	-49,836	0	0	495.7	0	0	0.0	0	0
60 - 65	1.4	0	0	-53,989	0	0	537.1	0	0	0.0	0	0
65 - 70	1.5	0	0	-58,142	0	0	578.4	0	0	0.0	0	0
70 - 75	1.6	0	0	-62,295	0	0	619.7	0	0	0.0	0	0
75 - 80	1.7	0	0	-66,448	0	0	661.0	0	0	0.0	0	0
80 - 85	1.8	2	20	-70,601	0	0	702.3	0	0	0.0	0	0
85 - 90	1.9	1	11	-74,754	0	0	743.6	0	0	0.0	0	0
90 - 95	2.0	0	0	-78,907	0	0	784.9	0	0	0.0	0	0
95 - 100	2.1	3	31	-83,060	0	0	826.2	38	1,377	0.0	0	0
Hours Off	0.0	0	7,735	0	0	4,133	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number
Range	1 1 2
(F)	

Max. Temp. 83.0 108.1 112.4

Mo./Hr. 7 14 8 20 8 21

Day Type 1 1 1

	Number of Hours
Above 100	0 1,584 2,508
95 - 100	0 1,043 420
90 - 95	0 339 151
85 - 90	0 420 341
80 - 85	0 286 252
75 - 80	2,875 0 17
70 - 75	797 17 324
65 - 70	85 5,071 4,747
60 - 65	859 0 0
55 - 60	747 0 0
50 - 55	670 0 0
Below 50	2,727 0 0

Min. Temp. 33.1 67.9 67.9

Mo./Hr. 2 9 2 7 1 16

Day Type 4 2 1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On-Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	338	1	143	0
Feb	306	1	146	0
March	347	1	94	0
April	326	1	38	0
May	371	4	0	0
June	672	5	0	0
July	989	5	0	0
Aug	701	5	0	0
Sept	354	4	0	0
Oct	342	1	19	0
Nov	326	1	60	0
Dec	334	1	116	0
Total	5,407	5	615	0

Building Energy Consumption = 31,322 (Btu/Sq Ft/Year)
Source Energy Consumption = 53,818 (Btu/Sq Ft/Year)

Floor Area = 2,552 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2

WALL & ROOF INSULATION

ELEC 1 1 1 1 0 0 0 0 0 0 1 1 5
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 4.8 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)		
Cooling Equipment						
1	EQ1161	AIR-CLD COND COMP <15 TONS	3.5	71.95		
Sub Total			3.5	71.95		
Sub Total			0.0	0.00		
Air Moving Equipment						
1	SUMMATION OF FAN ELECTRICAL DEMAND		0.1	1.47		
Sub Total			0.1	1.47		
Sub Total			0.0	0.00		
Miscellaneous						
Lights			1.3	26.58		
Base Utilities			0.0	0.00		
Misc Equipment			0.0	0.00		
Sub Total			1.3	26.58		
Grand Total			4.8	100.00		

** **
** TRACE 600 ANALYSIS **
** by **
** **

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 318

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	14:16: 6 1/20/94
Dataset Name:	C8318 .TM

AIRFLOW - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
1 PTAC		0	1,462	1,462	1,795	333	0	0
2 RAD		0	0	0	0	432	0	0
Totals		0	1,462	1,462	1,795	815	0	0

CAPACITY - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
		1 PTAC	3.2	0.0	0.0	3.2	-52,992	0	0	0	0	-52,992
2 RAD		0.0	0.0	0.0	0.0	-74,157	0	0	0	0	0	-74,157
Totals		3.2	0.0	0.0	3.2	-127,149	0	0	0	0	0	-127,149

The building peaked at hour 13 month 7 with a capacity of 3.2 tons

ENGINEERING CHECKS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	1.39	450.0	324.7	36.96	1.39	-50.23	1,055	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-49.54	1,497	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/13 * Mo/Hr: 7/13 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 89/ 74/105.0 * OADB: 89 * OADB: 4
 * * *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (\$)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	4,708	170		4,878	12.51	*	4,773	15.61	*	-3,843	-4,055	7.78
Glass Solar	7,164	0		7,164	18.37	*	7,391	24.17	*	0	0	0.00
Glass Cond	1,004	0		1,004	2.58	*	917	3.00	*	-6,206	-6,206	11.91
Wall Cond	10,560	610		11,170	28.64	*	10,730	35.09	*	-17,668	-18,649	35.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	13,360			13,360	34.26	*	4,656	15.23	*	-23,200	-23,200	44.52
Sub Total==>	36,797	780		37,577	96.36	*	28,467	93.09	*	-50,917	-52,110	100.00
Internal Loads						*			*			
Lights	494	0		494	1.27	*	634	2.07	*	0	0	0.00
People	715			715	1.83	*	410	1.34	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	1,210	0	0	1,210	3.10	*	1,044	3.41	*	0	0	0.00
Ceiling Load	561	-561		0	0.00	*	1,068	3.49	*	-961	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	0.53	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	38,568	219	0	38,995	100.00	*	30,580	100.00	*	-51,878	-52,110	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf) (%)
Main Clg	3.2	39.0	30.4	1,462	75.8 62.7 66.5	55.7 53.6 59.5	1,055
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	Part	0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	ExFlr	0
Totals	3.2	39.0				Roof	426
						Wall	1,234
							163 13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-53.0	1,462	67.3	100.6	Infil	0	0	Clg Cfm/Sqft	1.39	SADB	55.8	100.6
Aux Htg	0.0	0	0.0	0.0	Supply	333	333	Clg Cfm/Ton	449.98	Plenum	76.4	66.3
Preheat	-0.0	1,462	67.1	55.7	Mincfm	1,462	1,462	Clg Sqft/Ton	324.66	Return	75.7	67.1
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	36.96	Ret/OA	75.7	67.1
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	3	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-53.0				Auxil	0	0	Htg Cfm/SqFt	1.39	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-50.23	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==>						Mo/Hr: 0/ 0			Mo/Hr: 0/ 0		
Outside Air ==>						OADB/WB/HR: 0/ 0/ 0.0			OADB: 0		
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak (Btuh)	Coil Peak (Btuh)	Percent (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-4,681	-5,047
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,592	-27,068
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-33,550	-33,550
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-72,315	-74,157
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,672	0
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-77,986	-74,157
						*			*		
						*			*		

-----COOLING COIL SELECTION-----								-----AREAS-----		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Totals	0.0	0.0								

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA	0.0	Type Clg	Htg	
Main Htg	-74.2	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	482	Clg Cfm/Ton	0.00	Plenum	0.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0
Total	-74.2				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0
						0	Htg Btuh/SqFt	-49.54	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr		Wintr		Summr		Wintr					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	LIVING ROOM	0.000	0.002	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63		
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04		
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93		
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63		
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04		
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93		
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91		
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	17.6	6.32		
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	38.4	11.11		
8	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.549	17.7	6.56		
9	BATH	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	25.2	8.59		
10	BATH	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	20.9	7.62		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.103	0.566	0.579	0.272	0.549	19.7	6.99		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.137	0.577	0.591	0.272	0.549	19.4	6.94		
Building		0.000	0.000	0.000	0.000	0.142	0.579	0.593	0.272	0.549	19.3	6.93		

BUILDING AREAS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Number of Duplicate Flr	Area/Dupl Rm	Floor Room (sqft)	Total Area (sqft)	Partition Area (sqft)	Floor Area (sqft)						
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	0	47	4	10	34
Zone	2 Total/Ave.				442	0	0	0	0	154	62	11	489
System	2 Total/Ave.				1,497	0	0	0	0	580	224	13	1,560
Building					2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.142 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.312 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.269 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 10.87 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 21.36 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	7	92	-6,357	12	545	73.1	0	0	0.0	0	0
5 - 10	0.3	8	110	-12,715	13	611	146.2	0	0	0.0	0	0
10 - 15	0.5	11	145	-19,072	15	704	219.3	0	0	0.0	0	0
15 - 20	0.6	9	119	-25,430	20	921	292.4	42	1,530	0.0	0	0
20 - 25	0.8	5	62	-31,787	18	848	365.6	0	0	0.0	0	0
25 - 30	1.0	16	217	-38,145	12	552	438.7	0	0	0.0	0	0
30 - 35	1.1	9	120	-44,502	10	457	511.8	0	0	0.0	0	0
35 - 40	1.3	11	150	-50,860	0	0	584.9	0	0	0.0	0	0
40 - 45	1.5	9	118	-57,217	0	0	658.0	0	0	0.0	0	0
45 - 50	1.6	5	64	-63,575	0	0	731.1	21	765	0.0	0	0
50 - 55	1.8	2	28	-69,932	0	0	804.2	0	0	0.0	0	0
55 - 60	1.9	0	4	-76,289	0	0	877.3	0	0	0.0	0	0
60 - 65	2.1	2	27	-82,647	0	0	950.5	0	0	0.0	0	0
65 - 70	2.3	0	0	-89,004	0	0	1,023.6	0	0	0.0	0	0
70 - 75	2.4	0	0	-95,362	0	0	1,096.7	0	0	0.0	0	0
75 - 80	2.6	0	0	-101,719	0	0	1,169.8	0	0	0.0	0	0
80 - 85	2.8	0	0	-108,077	0	0	1,242.9	0	0	0.0	0	0
85 - 90	2.9	2	31	-114,434	0	0	1,316.0	0	0	0.0	0	0
90 - 95	3.1	0	0	-120,792	0	0	1,389.1	0	0	0.0	0	0
95 - 100	3.2	2	31	-127,149	0	0	1,462.2	38	1,377	0.0	0	0
Hours Off	0.0	0	7,442	0	0	4,122	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number		
Range (F)	1	1	2
Max. Temp.	86.1	104.1	105.9
Mo./Hr.	7	14	7
Day Type	1	1	1
			Number of Hours
Above 100	0	0	154
95 - 100	0	465	706
90 - 95	0	1,092	1,234
85 - 90	0	923	992
80 - 85	82	913	472
75 - 80	2,457	279	114
70 - 75	879	0	384
65 - 70	271	5,088	4,704
60 - 65	846	0	0
55 - 60	720	0	0
50 - 55	780	0	0
Below 50	2,725	0	0
Min. Temp.	30.8	67.9	67.9
Mo./Hr.	2	9	3
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On-Peak (Thrm)	HOT W DMND On Peak (Thrm/hr)
Jan	339	1	233	0
Feb	306	1	227	0
March	347	1	147	0
April	326	1	60	0
May	498	6	0	0
June	909	6	0	0
July	1,317	7	0	0
Aug	912	6	0	0
Sept	460	6	0	0
Oct	343	1	49	0
Nov	327	1	105	0
Dec	335	1	197	0
Total	6,418	7	1,018	0

Building Energy Consumption = 48,484 (Btu/Sq Ft/Year) Floor Area = 2,552 (Sq Ft)
Source Energy Consumption = 78,952 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

ELEC 1 1 1 1 0 0 0 0 0 1 1 1 8
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 6.6 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref.	Equipment Num.	Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment					
1	EQ1161		AIR-CLD COND COMP <15 TONS	5.2	78.81
Sub Total					
0.0 0.00					
Sub Total					
0.0 0.00					
Air Moving Equipment					
1			SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.89
Sub Total					
0.1 1.89					
Sub Total					
0.0 0.00					
Miscellaneous					
Lights 1.3 19.30					
Base Utilities 0.0 0.00					
Misc Equipment 0.0 0.00					
Sub Total 1.3 19.30					
Grand Total 6.6 100.00					

```
*****
*****  
**          T R A C E      6 0 0      A N A L Y S I S      **  
**  
**          by           **  
**  
*****  
*****
```

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 318

Weather File Code: CARLISLE
 Location: ENERGY SAVINGS OPPORTUNITY STUDY
 Latitude: 40.2 (deg)
 Longitude: 77.2 (deg)
 Time Zone: 5
 Elevation: 475 (ft)
 Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
 Winter Clearness Number: 1.00
 Summer Design Dry Bulb: 92 (F)
 Summer Design Wet Bulb: 72 (F)
 Winter Design Dry Bulb: 4 (F)
 Summer Ground Relectance: 0.20
 Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)
 Air Specific Heat: 0.2444 (Btu/lbm/F)
 Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
 Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
 Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September
 System Simulation Period: January To December
 Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 14:27:31 1/20/94
 Dataset Name: CB318.TM

AIRFLOW - ALTERNATIVE 4
COMBINED ECOS

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	762	762	1,034	271	0	0
2 RAD		0	0	0	0	393	0	0
Totals		0	762	762	1,034	664	0	0

CAPACITY - ALTERNATIVE 4
COMBINED ECOS

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		1.9	0.0	0.0	1.9	29,165	0	0	0	0	0	0	-29,165
2 RAD		0.0	0.0	0.0	0.0	41,296	0	0	0	0	0	0	-41,296
Totals		1.9	0.0	0.0	1.9	70,461	0	0	0	0	0	0	-70,461

The building peaked at hour 14 month 7 with a capacity of 1.8 tons

ENGINEERING CHECKS - ALTERNATIVE 4
COMBINED ECOS

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				CFM/Sq Ft	CFM/Ton	Sq Ft/Ton	Btuh/Sq Ft	CFM/Sq Ft	BTUH/SQ FT	Floor Area Sq Ft	
1 Main	PTAC		0.00	0.72	401.2	555.2	21.62	0.72	-27.64	1,055	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-27.59	1,497	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 7/14						*	Mo/Hr: 7/16			*	Mo/Hr: 13/ 1	
Outside Air ==> OADB/WB/HR: 91/ 74/105.0						*	OADB: 91	*	OADB: 4	*	*	
Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak (Btuh)	Coil Peak (Btuh)	Percent (%)	
Envelope Loads					*			*				
Skylite Solr	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Skylite Cond	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Roof Cond	678	100	778	3.41	*	738	4.51	*	-672	-810	2.80	
Glass Solar	6,960	0	6,960	30.5c	*	6,595	40.27	*	0	0	0.00	
Glass Cond	1,080	0	1,080	4.74	*	1,135	6.93	*	-6,206	-6,206	21.45	
Wall Cond	1,678	96	1,774	7.78	*	1,573	9.60	*	-2,849	-3,010	10.41	
Partition	0		0	0.00	*	0	0.00	*	0	0	0.00	
Exposed Floor	0		0	0.00	*	0	0.00	*	0	0	0.00	
Infiltration	10,896		10,896	47.78	*	4,363	26.64	*	-18,904	-18,904	65.34	
Sub Total==>	21,301	197	21,498	94.27	*	14,404	87.95	*	-28,631	-28,931	100.00	
Internal Loads					*			*				
Lights	486	0	486	2.13	*	1,192	7.28	*	0	0	0.00	
People	712		712	3.12	*	484	2.96	*	0	0	0.00	
Misc	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sub Total==>	1,198	0	1,198	5.25	*	1,677	10.24	*	0	0	0.00	
Ceiling Load	168	-168	0	0.00	*	297	1.81	*	-308	0	0.00	
Outside Air	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sup. Fan Heat			108	0.48	*		0.00	*		0	0.00	
Ret. Fan Heat		0	0	0.00	*		0.00	*		0	0.00	
Duct Heat Pkup		0	0	0.00	*		0.00	*		0	0.00	
OV/UNDR Sizing	0		0	0.00	*	0	0.00	*	0	0	0.00	
Exhaust Heat		0	0	0.00	*		0.00	*		0	0.00	
Terminal Bypass		0	0	0.00	*		0.00	*		0	0.00	
Grand Total==>	22,667	28	0	22,804	100.00	*	16,377	100.00	*	-28,939	-28,931	100.00

COOLING COIL SELECTION							
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (Mbh)	Entering DB/WB/HR (cfm)	Deg F Deg F	Deg F Grains	Leaving DB/WB/HR Deg F Grains	
Main Clg	1.9	22.8	15.9	762	75.3 63.5	71.0 55.2 53.4	59.4
Aux Clg	0.0	0.0	0.0	0	0.0 0.0	0.0 0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0	0.0 0.0	0.0
Totals	1.9	22.8					

HEATING COIL SELECTION						AIRFLOWS (cfm)			ENGINEERING CHECKS--			TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Cdg % OA 0	0.0	Type	Cdg	Htg			
Main Htg	-29.2	762	67.7	102.9	Infil	271	271	0.72	SADB	55.3	102.9			
Aux Htg	0.0	0	0.0	0.0	Supply	762	762	401.16	Plenum	75.4	67.4			
Preheat	-0.0	762	67.6	55.1	Mincfm	0	0	555.17	ExFlr	75.3	67.6			
Reheat	0.0	0	0.0	0.0	Return	762	762	21.62	Ret/OA	75.3	67.6			
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0.0	Runarnd	75.0	68.0			
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0.72	Fn MtrTD	0.0	0.0			
Total	-29.2				Auxil	0	0	-27.64	Fn BldTD	0.0	0.0			
									Fn Frict	0.1	0.0			

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4
 * * *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-840	-1,086
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492
Wall Cond	0	0		0	0.00	*	0	0.00	*	-4,127	-4,381
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-27,337	-27,337
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-40,796	-41,296
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-1,305	0
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-42,101	-41,296
						*					

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	Roof	580
Totals	0.0	0.0					Wall	1,784
								224 13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-41.3	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	393	Clg Cfm/Ton	0.00	Plenum	0.0	66.7
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-41.3				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-27.59	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr		Wintr		Summr		Wintr					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71		
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31		
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40		
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33		
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71		
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31		
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40		
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20		
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	18.8	6.56		
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	41.8	11.78		
8	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.549	18.8	6.78		
9	BATH	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	26.9	8.93		
10	BATH	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	22.9	8.03		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.028	0.566	0.579	0.044	0.549	21.1	7.28		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.029	0.577	0.591	0.044	0.549	20.8	7.22		
Building		0.000	0.000	0.000	0.000	0.030	0.579	0.593	0.044	0.549	20.7	7.21		

BUILDING AREAS - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING AREAS -----

Room Number	Description	Floor Area/Dupl		Total Floor Area	Partition Area	Exposed			Net Roof Area	Window Area	Win /Wl (%)	Net Wall Area
		Duplicate Flr	Rm	(sqft)	(sqft)	Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	(sqft)	(sqft)	(%)	
1	LIVING ROOM	1	1	254	254	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	47	4	10	34
Zone	2 Total/Ave.			442	0	0	0	0	154	62	11	489
System	2 Total/Ave.			1,497	0	0	0	0	580	224	13	1,560
Building				2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
COMBINED ECOS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.030 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.113 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.51 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.40 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load ----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.1	7	83	-3,523	13	550	38.1	0	0	0.0	0	0
5 - 10	0.2	12	144	-7,046	14	598	76.2	0	0	0.0	0	0
10 - 15	0.3	6	72	-10,569	19	822	114.4	0	0	0.0	0	0
15 - 20	0.4	4	47	-14,092	21	922	152.5	42	1,530	0.0	0	0
20 - 25	0.5	16	194	-17,615	17	733	190.6	0	0	0.0	0	0
25 - 30	0.6	13	166	-21,138	12	528	228.7	0	0	0.0	0	0
30 - 35	0.7	8	104	-24,661	5	212	266.8	0	0	0.0	0	0
35 - 40	0.8	7	93	-28,184	0	0	304.9	0	0	0.0	0	0
40 - 45	0.9	10	128	-31,708	0	0	343.1	0	0	0.0	0	0
45 - 50	1.0	7	87	-35,231	0	0	381.2	21	765	0.0	0	0
50 - 55	1.0	2	20	-38,754	0	0	419.3	0	0	0.0	0	0
55 - 60	1.1	4	51	-42,277	0	0	457.4	0	0	0.0	0	0
60 - 65	1.2	0	0	-45,800	0	0	495.5	0	0	0.0	0	0
65 - 70	1.3	0	0	-49,323	0	0	533.6	0	0	0.0	0	0
70 - 75	1.4	0	0	-52,846	0	0	571.8	0	0	0.0	0	0
75 - 80	1.5	0	0	-56,369	0	0	609.9	0	0	0.0	0	0
80 - 85	1.6	0	0	-59,892	0	0	648.0	0	0	0.0	0	0
85 - 90	1.7	0	0	-63,415	0	0	686.1	0	0	0.0	0	0
90 - 95	1.8	0	0	-66,938	0	0	724.2	0	0	0.0	0	0
95 - 100	1.9	5	62	-70,461	0	0	762.3	38	1,377	0.0	0	0
Hours Off	0.0	0	7,509	0	0	4,395	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	Zone Number
Max. Temp.	83.0	108.1	112.4	
Mo./Hr.	7	14	8	20
Day Type	1	1	1	
				Number of Hours
Above 100	0	1,584	2,508	
95 - 100	0	1,043	420	
90 - 95	0	339	151	
85 - 90	0	420	341	
80 - 85	31	286	252	
75 - 80	3,000	0	68	
70 - 75	641	68	494	
65 - 70	297	5,020	4,526	
60 - 65	895	0	0	
55 - 60	653	0	0	
50 - 55	671	0	0	
Below 50	2,572	0	0	
Min. Temp.	34.4	67.9	67.9	
Mo./Hr.	2	9	3	20
Day Type	4	1	1	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	338	1	118	0
Feb	306	1	120	0
March	347	1	75	0
April	326	1	26	0
May	401	4	0	0
June	706	4	0	0
July	989	5	0	0
Aug	721	4	0	0
Sept	382	4	0	0
Oct	342	1	11	0
Nov	326	1	47	0
Dec	334	1	96	0
Total	5,518	5	492	0

Building Energy Consumption = 26,664 (Btu/Sq Ft/Year) Floor Area = 2,552 (Sq Ft)
Source Energy Consumption = 47,853 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

- EQUIPMENT ENERGY CONSUMPTION -

Trane Air Conditioning Economics By: Trane Customer Direct Service Network

V 600
PAGE 47

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4 COMBINED ECOS

ELEC 1 1 1 0 0 0 0 0 0 0 1 1 4
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 4.5 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	3.2	70.28
Sub Total			3.2	70.28
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.45
Sub Total			0.1	1.45
Sub Total			0.0	0.00
Miscellaneous				
Lights			1.3	28.28
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			1.3	28.28
Grand Total			4.5	100.00

Building 321

Trace Input File

933702

CONTENTS OF : E:\CB321.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 321
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/1/1/DINING ROOM/181/1/1/.8/.39/10
14 20/2/1/LIVING ROOM/539/1/1/.8/.39/10
15 20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
16 20/4/1/BEDROOM/157/1/1/0//8.5
17 20/5/1/3RD FLOOR/160/1/1/0//9
18 20/6/2/KITCHEN/156/1/1/.8/.39/10
19 20/7/2/BACK PORCH/59/1/1/0//10
20 20/8/2/BATH/90/1/1/.8/.39/8.5
21 20/9/2/BEDROOM/148/1/1/0//8.5
22 20/10/2/STAIRS/170/1/1/0//17
23 20/11/2/BATH/76/1/1/0//9
24 21/M///CBLQTX///CBLQTX
25 22/4/1/YES///199
26 22/5/1/YES///200
27 22/7/1/YES///200
28 22/9/1/YES///199
29 22/10/1/NO/13/6//200
30 22/11/1/YES///200
31 24/1/1/12.5/9//167/17
32 24/1/2/14.5/9//167/107
33 24/2/1/19/9//167/17
34 24/2/2/19/9//167/197
35 24/2/3/28/9//167/287
36 24/3/1/19/8.5//167/17
37 24/3/2/17.5/8.5//167/107
38 24/4/1/14/8.5//167/287
39 24/4/2/12.5/8.5//167/17
40 24/5/1/7/7.1//167/17
41 24/6/1/13/9//167/107
42 24/7/1/5/9//167/107
43 24/7/2/11.75/9//167/197
44 24/7/3/5/9//167/287
45 24/8/1/10/8.5//167/107
46 24/8/2/9/8.5//167/197
47 24/9/1/12.5/8.5//167/197
48 24/9/2/13/8.5//167/287
49 24/10/1/6/16//167/197
50 25/1/1/5.5/3/1/.55/.57
51 25/1/2/5.5/3/1/.55/.57
52 25/2/1/5.5/3/1/.55/.57
53 25/2/2/5.5/3/1/.55/.57
54 25/2/3/5.5/3/2/.55/.57
55 25/3/1/5/3/2/.55/.57
56 25/3/2/5/3/1/.55/.57
57 25/4/1/5/3/1/.55/.57
58 25/4/2/5/3/1/.55/.57

CONTENTS OF : E:\CB321.TM

LINE # -----

59 25/5/1/2.5/1.7/2/.55/.57
60 25/6/1/4.2/3/1/.55/.57
61 25/7/2/10.8/1/1/1.04/1
62 25/8/1/4.3/3/1/.55/.57
63 25/8/2/3.3/2.5/1/.55/.57
64 25/9/1/5/3/1/.55/.57
65 25/9/2/5/3/1/.55/.57
66 25/10/1/20/1/1/.61/.88
67 26/M/CBLQP/CBLQL/0FF//0FF/CBLQCLG/0FF/0FF/0FF/0FF
68 27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
69 29/1/////.29/CFM-SF/.29/CFM-SF
70 29/2/////.29/CFM-SF/.29/CFM-SF
71 29/3/////.29/CFM-SF/.29/CFM-SF
72 29/4/////.29/CFM-SF/.29/CFM-SF
73 29/5/////.29/CFM-SF/.29/CFM-SF
74 29/6////////.29/CFM-SF
75 29/7////////.29/CFM-SF
76 29/8////////.29/CFM-SF
77 29/9////////.29/CFM-SF
78 29/10////////.29/CFM-SF
79 29/11////////.29/CFM-SF
80 31/5/1/36/7//162/SINE-FIT/95/40
81 31/10/1/16/7//162/SINE-FIT/95/40
82 31/11/1/18/7//162/SINE-FIT/95/40
83 SYSTEM - 1
84 39/1/BASE BUILDING
85 40/1/PTAC
86 41/1/1/1
87 42/1/.2
88 45/1/CBLQCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
89 40/2/RAD
90 41/2/1/2
91 45/2/0FF/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
92 EQUIPMENT - 1
93 59/1/CARLISLE///BASE BUILDING
94 60/1/1/PKPLANT/1/1
95 62/1/EQ1161/5
96 65/1/1//2/2
97 67/1/EQ2102/1
98 69/1/EQ4003
99 LOAD - 2
100 19/2/WALL & ROOF INSULATION
101 20/1/1/DINING ROOM/181/1/1/.8/.39/10
102 20/2/1/LIVING ROOM/539/1/1/.8/.39/10
103 20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
104 20/4/1/BEDROOM/157/1/1/0//8.5
105 20/5/1/3RD FLOOR/160/1/1/0//9
106 20/6/2/KITCHEN/156/1/1/.8/.39/10
107 20/7/2/BACK PORCH/59/1/1/0//10
108 20/8/2/BATH/90/1/1/.8/.39/8.5
109 20/9/2/BEDROOM/148/1/1/0//8.5
110 20/10/2/STAIRS/170/1/1/0//17
111 20/11/2/BATH/76/1/1/0//9
112 21/M///CBLQTX///CBLQTX
113 22/4/1/YES///199
114 22/5/1/YES///200
115 22/7/1/YES///200
116 22/9/1/YES///199

CONTENTS OF : E:\CB321.TM

LINE # -----
117 22/10/1/NO/13/6//200
118 22/11/1/YES///200
119 24/1/1/12.5/9//126/17
120 24/1/2/14.5/9//126/107
121 24/2/1/19/9//126/17
122 24/2/2/19/9//126/197
123 24/2/3/28/9//126/287
124 24/3/1/19/8.5//126/17
125 24/3/2/17.5/8.5//126/107
126 24/4/1/14/8.5//126/287
127 24/4/2/12.5/8.5//126/17
128 24/5/1/7/7.1//126/17
129 24/6/1/13/9//126/107
130 24/7/1/5/9//126/107
131 24/7/2/11.75/9//126/197
132 24/7/3/5/9//126/287
133 24/8/1/10/8.5//126/107
134 24/8/2/9/8.5//126/197
135 24/9/1/12.5/8.5//126/197
136 24/9/2/13/8.5//126/287
137 24/10/1/6/16//126/197
138 25/1/1/5.5/3/1/.55/.57
139 25/1/2/5.5/3/1/.55/.57
140 25/2/1/5.5/3/1/.55/.57
141 25/2/2/5.5/3/1/.55/.57
142 25/2/3/5.5/3/2/.55/.57
143 25/3/1/5/3/2/.55/.57
144 25/3/2/5/3/1/.55/.57
145 25/4/1/5/3/1/.55/.57
146 25/4/2/5/3/1/.55/.57
147 25/5/1/2.5/1.7/2/.55/.57
148 25/6/1/4.2/3/1/.55/.57
149 25/7/2/10.8/1/1/1.04/1
150 25/8/1/4.3/3/1/.55/.57
151 25/8/2/3.3/2.5/1/.55/.57
152 25/9/1/5/3/1/.55/.57
153 25/9/2/5/3/1/.55/.57
154 25/10/1/20/1/1/.61/.88
155 26/M/CBLQP/CBLQL/0FF//0FF/CBLQCLG/0FF/0FF/0FF/0FF/0FF
156 27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
157 29/1/////.25/CFM-SF/.25/CFM-SF
158 29/2/////.25/CFM-SF/.25/CFM-SF
159 29/3/////.25/CFM-SF/.25/CFM-SF
160 29/4/////.25/CFM-SF/.25/CFM-SF
161 29/5/////.25/CFM-SF/.25/CFM-SF
162 29/6////////.25/CFM-SF
163 29/7////////.25/CFM-SF
164 29/8////////.25/CFM-SF
165 29/9////////.25/CFM-SF
166 29/10////////.25/CFM-SF
167 29/11////////.25/CFM-SF
168 31/5/1/36/7//162/SINE-FIT/95/40
169 31/10/1/16/7//162/SINE-FIT/95/40
170 31/11/1/18/7//162/SINE-FIT/95/40
171 SYSTEM - 2
172 39/2/WALL & ROOF INSULATION
173 40/1/PTAC
174 41/1/1/1

CONTENTS OF : E:\CB321.TM

LINE # -----

175 42/1/.2
176 45/1/CBLQCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
177 40/2/RAD
178 41/2/1/2
179 45/2/0FF/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
180 EQUIPMENT - 2
181 59/2/CARLISLE///WALL & ROOF INSULATION
182 60/1/1/PKPLANT/1/1
183 62/1/EQ1161/5
184 65/1/1//2/2
185 67/1/EQ2102/1
186 69/1/EQ4003
187 LOAD - 3
188 19/3/WEATHERSTRIP & CAULKING
189 20/1/1/DINING ROOM/181/1/1/.8/.39/10
190 20/2/1/LIVING ROOM/539/1/1/.8/.39/10
191 20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
192 20/4/1/BEDROOM/157/1/1/0//8.5
193 20/5/1/3RD FLOOR/160/1/1/0//9
194 20/6/2/KITCHEN/156/1/1/.8/.39/10
195 20/7/2/BACK PORCH/59/1/1/0//10
196 20/8/2/BATH/90/1/1/.8/.39/8.5
197 20/9/2/BEDROOM/148/1/1/0//8.5
198 20/10/2/STAIRS/170/1/1/0//17
199 20/11/2/BATH/76/1/1/0//9
200 21/M///CBLQTX///CBLQTX
201 22/4/1/YES///199
202 22/5/1/YES///200
203 22/7/1/YES///200
204 22/9/1/YES///199
205 22/10/1/N0/13/6//200
206 22/11/1/YES///200
207 24/1/1/12.5/9//167/17
208 24/1/2/14.5/9//167/107
209 24/2/1/19/9//167/17
210 24/2/2/19/9//167/197
211 24/2/3/28/9//167/287
212 24/3/1/19/8.5//167/17
213 24/3/2/17.5/8.5//167/107
214 24/4/1/14/8.5//167/287
215 24/4/2/12.5/8.5//167/17
216 24/5/1/7/7.1//167/17
217 24/6/1/13/9//167/107
218 24/7/1/5/9//167/107
219 24/7/2/11.75/9//167/197
220 24/7/3/5/9//167/287
221 24/8/1/10/8.5//167/107
222 24/8/2/9/8.5//167/197
223 24/9/1/12.5/8.5//167/197
224 24/9/2/13/8.5//167/287
225 24/10/1/6/16//167/197
226 25/1/1/5.5/3/1/.55/.57
227 25/1/2/5.5/3/1/.55/.57
228 25/2/1/5.5/3/1/.55/.57
229 25/2/2/5.5/3/1/.55/.57
230 25/2/3/5.5/3/2/.55/.57
231 25/3/1/5/3/2/.55/.57
232 25/3/2/5/3/1/.55/.57

CONTENTS OF : E:\CB321.TM

LINE # -----
233 25/4/1/5/3/1/.55/.57
234 25/4/2/5/3/1/.55/.57
235 25/5/1/2.5/1.7/2/.55/.57
236 25/6/1/4.2/3/1/.55/.57
237 25/7/2/10.8/1/1/1.04/1
238 25/8/1/4.3/3/1/.55/.57
239 25/8/2/3.3/2.5/1/.55/.57
240 25/9/1/5/3/1/.55/.57
241 25/9/2/5/3/1/.55/.57
242 25/10/1/20/1/1/.61/.88
243 26/M/CBLQP/CBLQL//OFF//OFF/CBLQCLG//OFF//OFF//OFF//OFF
244 27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
245 29/1///.24/CFM-SF/.24/CFM-SF
246 29/2///.24/CFM-SF/.24/CFM-SF
247 29/3///.24/CFM-SF/.24/CFM-SF
248 29/4///.24/CFM-SF/.24/CFM-SF
249 29/5///.24/CFM-SF/.24/CFM-SF
250 29/6///.24/CFM-SF
251 29/7///.24/CFM-SF
252 29/8///.24/CFM-SF
253 29/9///.24/CFM-SF
254 29/10///.24/CFM-SF
255 29/11///.24/CFM-SF
256 31/5/1/36/7//162/SINE-FIT/95/40
257 31/10/1/16/7//162/SINE-FIT/95/40
258 31/11/1/18/7//162/SINE-FIT/95/40
259 SYSTEM - 3
260 39/3/WEATHERSTRIP & CAULKING
261 40/1/PTAC
262 41/1/1/1
263 42/1/.2
264 45/1/CBLQCLG//OFF//OFF//OFF//OFF//OFF//OFF//OFF//OFF//OFF
265 40/2/RAD
266 41/2/1/2
267 45/2//OFF//OFF//OFF//OFF//CBLQHTG//OFF//OFF//OFF//OFF//OFF
268 EQUIPMENT - 3
269 59/3/CARLISLE///WEATHERSTRIP & CAULKING
270 60/1/1/PKPLANT/1/1
271 62/1/EQ1161/5
272 65/1/1//2/2
273 67/1/EQ2102/1
274 69/1/EQ4003
275 LOAD - 4
276 19/4/COMBINED ECOS
277 20/1/1/DINING ROOM/181/1/1/.8/.39/10
278 20/2/1/LIVING ROOM/539/1/1/.8/.39/10
279 20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
280 20/4/1/BEDROOM/157/1/1/0//8.5
281 20/5/1/3RD FLOOR/160/1/1/0//9
282 20/6/2/KITCHEN/156/1/1/.8/.39/10
283 20/7/2/BACK PORCH/59/1/1/0//10
284 20/8/2/BATH/90/1/1/.8/.39/8.5
285 20/9/2/BEDROOM/148/1/1/0//8.5
286 20/10/2/STAIRS/170/1/1/0//17
287 20/11/2/BATH/76/1/1/0//9
288 21/M///CBLQTX///CBLQTX
289 22/4/1/YES///199
290 22/5/1/YES///200

CONTENTS OF : E:\CB321.TM

LINE # -----
291 22/7/1/YES///200
292 22/9/1/YES///199
293 22/10/1/N0/13/6//200
294 22/11/1/YES///200
295 24/1/1/12.5/9//126/17
296 24/1/2/14.5/9//126/107
297 24/2/1/19/9//126/17
298 24/2/2/19/9//126/197
299 24/2/3/28/9//126/287
300 24/3/1/19/8.5//126/17
301 24/3/2/17.5/8.5//126/107
302 24/4/1/14/8.5//126/287
303 24/4/2/12.5/8.5//126/17
304 24/5/1/7/7.1//126/17
305 24/6/1/13/9//126/107
306 24/7/1/5/9//126/107
307 24/7/2/11.75/9//126/197
308 24/7/3/5/9//126/287
309 24/8/1/10/8.5//126/107
310 24/8/2/9/8.5//126/197
311 24/9/1/12.5/8.5//126/197
312 24/9/2/13/8.5//126/287
313 24/10/1/6/16//126/197
314 25/1/1/5.5/3/1/.55/.57
315 25/1/2/5.5/3/1/.55/.57
316 25/2/1/5.5/3/1/.55/.57
317 25/2/2/5.5/3/1/.55/.57
318 25/2/3/5.5/3/2/.55/.57
319 25/3/1/5/3/2/.55/.57
320 25/3/2/5/3/1/.55/.57
321 25/4/1/5/3/1/.55/.57
322 25/4/2/5/3/1/.55/.57
323 25/5/1/2.5/1.7/2/.55/.57
324 25/6/1/4.2/3/1/.55/.57
325 25/7/2/10.8/1/1/1.04/1
326 25/8/1/4.3/3/1/.55/.57
327 25/8/2/3.3/2.5/1/.55/.57
328 25/9/1/5/3/1/.55/.57
329 25/9/2/5/3/1/.55/.57
330 25/10/1/20/1/1/.61/.88
331 26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
332 27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
333 29/1/////.20/CFM-SF/.20/CFM-SF
334 29/2/////.20/CFM-SF/.20/CFM-SF
335 29/3/////.20/CFM-SF/.20/CFM-SF
336 29/4/////.20/CFM-SF/.20/CFM-SF
337 29/5/////.20/CFM-SF/.20/CFM-SF
338 29/6/////.20/CFM-SF
339 29/7/////.20/CFM-SF
340 29/8/////.20/CFM-SF
341 29/9/////.20/CFM-SF
342 29/10/////.20/CFM-SF
343 29/11/////.20/CFM-SF
344 31/5/1/36/7//162/SINE-FIT/95/40
345 31/10/1/16/7//162/SINE-FIT/95/40
346 31/11/1/18/7//162/SINE-FIT/95/40
347 SYSTEM - 4
348 39/4/COMBINED ECOS

CONTENTS OF : E:\CB321.TM

LINE # -----
349 40/1/PTAC
350 41/1/1/1
351 42/1/.2
352 45/1/CBLQCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
353 40/2/RAD
354 41/2/1/2
355 45/2/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
356 EQUIPMENT - 4
357 59/4/CARLISLE///COMBINED ECOS
358 60/1/1/PKPLANT/1/1
359 62/1/EQ1161/5
360 65/1/1//2/2
361 67/1/EQ2102/1
362 69/1/EQ4003

Building 321

Trace Output File

933702

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA

DEPARTMENT OF THE ARMY

BENATEC ASSOCIATES

BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Reflectance:	0.20
Winter Ground Reflectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:25:10 1/24/94
Dataset Name: CB321 .TM

AIRFLOW - ALTERNATIVE 1
BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	1,484	1,484	1,897	412	0	0
2 RAD		0	0	0	0	641	0	0
Totals		0	1,484	1,484	1,897	1,053	0	0

CAPACITY - ALTERNATIVE 1
BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		3.4	0.0	0.0	3.4	-58,107	0	0	0	0	0	-58,107
2 RAD		0.0	0.0	0.0	0.0	-90,309	0	0	0	0	0	-90,309
Totals		3.4	0.0	0.0	3.4	-148,415	0	0	0	0	0	-148,415

The building peaked at hour 16 month 7 with a capacity of 3.3 tons

ENGINEERING CHECKS - ALTERNATIVE 1
BASE BUILDING

----- E N G I N E E R I N G C H E C K S . -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft/Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	1.12	436.5	388.8	30.86	1.12	-43.95	1,322	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-44.69	2,021	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1

Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 89 * OADB: 4 *

	Space Sens.+Lat. (BtuH)	Ret. Air Sensible (BtuH)	Ret. Air Latent (BtuH)	Net Total (BtuH)	Percent Of Tot (%)	*	Space Sensible (BtuH)	Percent Of Tot (%)	*	Space Peak (BtuH)	Coil Peak (BtuH)	Percent Tot Sens (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	576	0		576	1.41	*	599	1.91	*	-568	-568	0.98
Glass Solar	6,842	0		6,842	16.77	*	7,707	24.59	*	0	0	0.00
Glass Cond	1,286	0		1,286	3.15	*	1,153	3.68	*	-6,575	-6,575	11.40
Wall Cond	12,639	1,039		13,678	33.52	*	13,690	43.69	*	-19,941	-21,587	37.42
Partition	164			164	0.40	*	164	0.52	*	-229	-229	0.40
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	15,941			15,941	39.07	*	5,832	18.61	*	-28,725	-28,725	49.80
Sub Total==>	37,448	1,039		38,487	94.33	*	29,144	93.01	*	-56,037	-57,683	100.00
Internal Loads						*			*			
Lights	1,268	0		1,268	3.11	*	1,312	4.19	*	0	0	0.00
People	835			835	2.05	*	426	1.36	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	2,103	0	0	2,103	5.16	*	1,738	5.55	*	0	0	0.00
Ceiling Load	357	-357		0	0.00	*	452	1.44	*	-577	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				211	0.52	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	39,909	682	0	40,801	100.00	*	31,334	100.00	*	-56,614	-57,683	100.00

COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR		Gross Total Floor	Glass (sf) (%)			
Main Clg	3.4	40.8	31.1	1,484	75.5	62.6	66.5	55.5	53.2	58.2	1,322
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	252
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
Totals	3.4	40.8									1,422
											183 13

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-58.1	1,484	67.1	103.1	Infil	0	0	Clg Cfm/Sqft	1.12	SADB	55.6	103.1
Aux Htg	0.0	0	0.0	0.0	Supply	412	412	Clg Cfm/Ton	436.50	Plenum	75.6	66.8
Preheat	-0.0	1,484	67.1	55.5	Mincfm	1,484	1,484	Clg Sqft/Ton	388.81	Return	75.5	67.1
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	30.86	Ret/DA	75.5	67.1
Humidif	0.0	0	0.0	0.0	Exhaust	1,484	1,484	No. People	3	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-58.1				Auxil	0	0	Htg Cfm/SqFt	1.12	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-43.95	Fn Frict	0.1	0.0

AREAS

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1

Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*						
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-1,234	-1,234	1.37
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-10,422	-10,422	11.54
Wall Cond	0	0		0	0.00	*	0	0.00	*	-31,588	-33,588	37.19
Partition	0			0	0.00	*	0	0.00	*	-446	-446	0.49
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-44,620	-44,620	49.41
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-88,309	-90,309	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-3,111	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0	0.00
Ret. Fan Heat	0			0	0.00	*			0.00	*	0	0.00
Duct Heat Pkup	0			0	0.00	*			0.00	*	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*	0	0.00
Terminal Bypass	0	0		0	0.00	*			0.00	*	0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-91,420	-90,309	100.00

COOLING COIL SELECTION

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	Part	490	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	Roof	678	0 0
Totals	0.0	0.0			Wall	2,209	277 13

HEATING COIL SELECTION

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-90.3	0	0.0	0.0	Infil	0	641	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	65.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-90.3				Auxil	0	0	Htg Btuh/SqFt	-44.69	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 1
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
			(Btu/hr/sqft/F)				Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Summr Windo	Wintr Wall		
			ExFlr	Summr Roof	Wintr Windo	Wall								
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25		
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85		
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74		
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03		
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72		
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09		
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25		
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85		
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74		
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03		
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72		
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09		
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	12.6	5.17		
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.272	0.000	49.1	13.92		
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	21.1	7.12		
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.5	10.07		
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.272	0.000	22.5	7.94		
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37		
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.272	0.568	25.8	8.55		
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.272	0.568	22.1	7.59		
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.272	0.568	21.3	7.39		

BUILDING AREAS - ALTERNATIVE 1

BASE BUILDING

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor Duplicate		Area/Dupl (sqft)	Total Room	Partition Area (sqft)	Exposed Floor		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Flr	Rm		Floor Area (sqft)		Area (sqft)	(sqft)				(sqft)	(%)	(sqft)
1	DINING ROOM	1	1	181	181	0	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
BASE BUILDING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.309 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.249 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 21.47 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.2	11	110	-7,421	9	443	74.2	0	0	0.0	0	0
5 - 10	0.3	6	62	-14,842	15	683	148.4	0	0	0.0	0	0
10 - 15	0.5	5	52	-22,262	13	625	222.6	0	0	0.0	0	0
15 - 20	0.7	11	115	-29,683	18	832	296.8	42	1,530	0.0	0	0
20 - 25	0.9	4	46	-37,104	18	844	371.0	0	0	0.0	0	0
25 - 30	1.0	7	76	-44,525	13	616	445.2	0	0	0.0	0	0
30 - 35	1.2	14	140	-51,945	12	552	519.4	0	0	0.0	0	0
35 - 40	1.4	4	42	-59,366	2	94	593.7	0	0	0.0	0	0
40 - 45	1.5	10	104	-66,787	0	0	667.9	0	0	0.0	0	0
45 - 50	1.7	13	132	-74,208	0	0	742.1	21	765	0.0	0	0
50 - 55	1.9	4	42	-81,628	0	0	816.3	0	0	0.0	0	0
55 - 60	2.0	5	51	-89,049	0	0	890.5	0	0	0.0	0	0
60 - 65	2.2	2	20	-96,470	0	0	964.7	0	0	0.0	0	0
65 - 70	2.4	0	0	-103,891	0	0	1,038.9	0	0	0.0	0	0
70 - 75	2.6	0	0	-111,312	0	0	1,113.1	0	0	0.0	0	0
75 - 80	2.7	0	0	-118,732	0	0	1,187.3	0	0	0.0	0	0
80 - 85	2.9	0	0	-126,153	0	0	1,261.5	0	0	0.0	0	0
85 - 90	3.1	0	0	-133,574	0	0	1,335.7	0	0	0.0	0	0
90 - 95	3.2	2	20	-140,995	0	0	1,409.9	0	0	0.0	0	0
95 - 100	3.4	1	11	-148,415	0	0	1,484.1	38	1,377	0.0	0	0
Hours Off	0.0	0	7,737	0	0	4,071	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	Zone Number
Max. Temp.	82.4	100.5	103.6	
Mo./Hr.	7 14	7 21	8 20	
Day Type	1	1	1	
				Number of Hours
Above 100	0	0	79	
95 - 100	0	249	748	
90 - 95	0	928	1,340	
85 - 90	0	935	882	
80 - 85	0	1,066	553	
75 - 80	2,401	486	70	
70 - 75	974	8	437	
65 - 70	314	5,088	4,651	
60 - 65	627	0	0	
55 - 60	769	0	0	
50 - 55	757	0	0	
Below 50	2,918	0	0	
Min. Temp.	30.9	67.9	67.9	
Mo./Hr.	2 9	3 20	1 20	
Day Type	4	1	1	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	444	2	288	1
Feb	401	2	283	1
March	455	2	187	0
April	427	2	81	0
May	536	7	0	0
June	950	7	0	0
July	1,417	7	0	0
Aug	935	7	0	0
Sept	478	7	0	0
Oct	449	2	62	0
Nov	428	2	129	0
Dec	438	2	242	0
Total	7,358	7	1,271	1

Building Energy Consumption = 45,533 (Btu/Sq Ft/Year)
Source Energy Consumption = 73,232 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

EQUIPMENT ENERGY CONSUMPTION

Trane Air Conditioning Economics

V 600
PAGE 11

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 7.2 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	5.4	75.15
Sub Total			5.4	75.15
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.76
Sub Total			0.1	1.76
Sub Total			0.0	0.00
Miscellaneous				
Lights			1.7	23.10
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			1.7	23.10
Grand Total			7.2	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	12:38:18 1/24/94
Dataset Name:	CB321.TM

AIRFLOW - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	848	848	1,203	356	0	0
2 RAD		0	0	0	0	552	0	0
Totals		0	848	848	1,203	908	0	0

CAPACITY - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent. Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		2.2	0.0	0.0	2.2	-35,740	0	0	0	0	0	-35,740
2 RAD		0.0	0.0	0.0	0.0	-55,996	0	0	0	0	0	-55,996
Totals		2.2	0.0	0.0	2.2	-91,735	0	0	0	0	0	-91,735

The building peaked at hour 16 month 7 with a capacity of 2.2 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	0.64	378.4	590.2	20.33	0.64	-27.03	1,322	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-27.71	2,021	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1

Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 89 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak (Btuh)	Coil Peak (Btuh)	Percent Tot Sens (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	545	0		545	2.03	*	623	3.30	*	-568	-568	1.59
Glass Solar	6,399	0		6,399	23.80	*	7,203	38.14	*	0	0	0.00
Glass Cond	1,365	0		1,365	5.08	*	1,264	6.69	*	-6,575	-6,575	18.46
Wall Cond	1,734	152		1,886	7.01	*	1,923	10.18	*	-3,216	-3,485	9.78
Partition	164			164	0.61	*	164	0.87	*	-229	-229	0.64
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	14,318			14,318	53.27	*	5,323	28.18	*	-24,763	-24,763	69.52
Sub Total==>	24,523	152		24,675	91.80	*	16,498	87.36	*	-35,349	-35,618	100.00
Internal Loads						*			*			
Lights	1,255	0		1,255	4.67	*	1,633	8.65	*	0	0	0.00
People	829			829	3.09	*	461	2.44	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	2,084	0	0	2,084	7.75	*	2,095	11.09	*	0	0	0.00
Ceiling Load	103	-103		0	0.00	*	293	1.55	*	-318	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				121	0.45	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	26,710	48	0	26,879	100.00	*	18,886	100.00	*	-35,667	-35,618	100.00

COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Grains	Leaving DB/WB/HR Deg F	Deg F	Grains	Gross Floor	Glass (sf)	(%)
Main Clg	2.2	26.9	18.1	848	75.2	63.2	69.7	54.5	52.3	56.5	Part	252
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	317
Totals	2.2	26.9									Wall	1,422
												183 13

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	0.0	Type	Clg	Htg
Main Htg	-35.7	848	67.9	106.7	Infil	356	356	Clg Cfm/Sqft	0.64	SADB	54.5	106.7
Aux Htg	0.0	0	0.0	0.0	Supply	848	848	Clg Cfm/Ton	378.41	Plenum	75.2	67.7
Preheat	-0.0	848	67.8	54.4	Mincfm	0	0	Clg Sqft/Ton	590.19	Return	75.1	67.8
Reheat	0.0	0	0.0	0.0	Return	848	848	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.64	Fn BldTD	0.0	0.0
Total	-35.7				Auxil	0	0	Htg Btuh/SqFt	-27.03	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==> Mo/Hr: 0/ 0						*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1
Outside Air ==> DADB/WB/HR: 0/ 0/ 0.0						*	DADB:	0	*	DADB:	4
Space Sens.+Lat. Envelope Loads Skylite Solr Skylite Cond Roof Cond Glass Solar Glass Cond Wall Cond Partition Exposed Floor Infiltration Sub Total==>	(Btu/h) (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%) Of Tot *	Space Sensible (Btuh)	Percent (%) Of Tot *	Space Peak (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (\$)	
				0	0.00 *	0	0.00 *	0	0	0.00	
				0	0.00 *	0	0.00 *	0	0	0.00	
				0	0.00 *	0	0.00 *	-1,234	-1,234	2.20	
				0	0.00 *	0	0.00 *	0	0	0.00	
				0	0.00 *	0	0.00 *	-10,422	-10,422	18.61	
				0	0.00 *	0	0.00 *	-5,094	-5,429	9.70	
				0	0.00 *	0	0.00 *	-446	-446	0.80	
				0	0.00 *	0	0.00 *	0	0	0.00	
				0	0.00 *	0	0.00 *	-38,465	-38,465	68.69	
				0	0.00 *	0	0.00 *	-55,660	-55,996	100.00	
Internal Loads											
Lights	0	0		0	0.00 *	0	0.00 *	0	0	0.00	
People	0			0	0.00 *	0	0.00 *	0	0	0.00	
Misc	0	0	0	0	0.00 *	0	0.00 *	0	0	0.00	
Sub Total==>	0	0	0	0	0.00 *	0	0.00 *	0	0	0.00	
Ceiling Load	0	0		0	0.00 *	0	0.00 *	-1,521	0	0.00	
Outside Air	0	0	0	0	0.00 *	0	0.00 *	0	0	0.00	
Sup. Fan Heat				0	0.00 *		0.00 *		0	0.00	
Ret. Fan Heat	0			0	0.00 *		0.00 *		0	0.00	
Duct Heat Pkup	0			0	0.00 *		0.00 *		0	0.00	
OV/UNDR Sizing	0			0	0.00 *	0	0.00 *	0	0	0.00	
Exhaust Heat	0	0		0	0.00 *		0.00 *		0	0.00	
Terminal Bypass	0	0		0	0.00 *		0.00 *		0	0.00	
Grand Total==>	0	0	0	0	0.00 *	0	0.00 *	-57,181	-55,996	100.00	

COOLING COIL SELECTION								
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering Deg F	DB/WB/HR Deg F	Leaving Deg F	DB/WB/HR Grains	Gross Total Floor	Glass (sf) (%)
Main Clg	0.0	0.0	0	0.0	0.0	0.0	2,021	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	Part 490	
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	Exflr 0	
Totals	0.0	0.0	0	0.0	0.0	0.0	Roof 678	0 0
							Wall 2,209	277 13

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-56.0	0	0.0	Infil	0	552	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	67.3
Preheat	0.0	0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	No. People	0	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-56.0			Auxil	0	0	Htg Btuh/SqFt	-27.71	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values						Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr		Wintr		Summr					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	13.2	5.30
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.044	0.000	52.3	14.55
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	22.6	7.44
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.8	10.32
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.044	0.000	22.9	8.03
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.044	0.568	26.7	8.74
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.044	0.568	23.0	7.78
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.044	0.568	22.3	7.58

BUILDING AREAS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING AREAS -----

Room Number	Description	Floor Flr	Number of Duplicate Rm	Floor Area/Dupl (sqft)	Total Room Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
				(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(%)	(sqft)
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.110 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.48 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.1	8	76	-4,587	11	500	42.4	0	0	0.0	0	0
5 - 10	0.2	9	84	-9,174	17	764	84.8	0	0	0.0	0	0
10 - 15	0.3	8	77	-13,760	15	661	127.1	0	0	0.0	0	0
15 - 20	0.4	4	39	-18,347	19	856	169.5	42	1,530	0.0	0	0
20 - 25	0.6	5	50	-22,934	18	811	211.9	0	0	0.0	0	0
25 - 30	0.7	13	123	-27,521	12	529	254.3	0	0	0.0	0	0
30 - 35	0.8	8	82	-32,107	9	394	296.7	0	0	0.0	0	0
35 - 40	0.9	7	64	-36,694	0	0	339.0	0	0	0.0	0	0
40 - 45	1.0	9	86	-41,281	0	0	381.4	0	0	0.0	0	0
45 - 50	1.1	13	127	-45,868	0	0	423.8	21	765	0.0	0	0
50 - 55	1.2	6	54	-50,454	0	0	466.2	0	0	0.0	0	0
55 - 60	1.3	6	62	-55,041	0	0	508.6	0	0	0.0	0	0
60 - 65	1.5	2	20	-59,628	0	0	551.0	0	0	0.0	0	0
65 - 70	1.6	0	0	-64,215	0	0	593.3	0	0	0.0	0	0
70 - 75	1.7	0	0	-68,802	0	0	635.7	0	0	0.0	0	0
75 - 80	1.8	0	0	-73,388	0	0	678.1	0	0	0.0	0	0
80 - 85	1.9	0	0	-77,975	0	0	720.5	0	0	0.0	0	0
85 - 90	2.0	0	0	-82,562	0	0	762.9	0	0	0.0	0	0
90 - 95	2.1	0	0	-87,149	0	0	805.2	0	0	0.0	0	0
95 - 100	2.2	3	31	-91,735	0	0	847.6	38	1,377	0.0	0	0
Hours Off	0.0	0	7,785	0	0	4,245	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	Zone Number
Max. Temp.	80.9	105.5	110.5	
Mo./Hr.	7 14	8 21	8 21	
Day Type	1	1	1	
				Number of Hours
Above 100	0	1,232	2,177	
95 - 100	0	1,168	751	
90 - 95	0	362	62	
85 - 90	0	383	348	
80 - 85	0	509	351	
75 - 80	2,852	18	102	
70 - 75	820	17	453	
65 - 70	85	5,071	4,516	
60 - 65	734	0	0	
55 - 60	856	0	0	
50 - 55	537	0	0	
Below 50	2,876	0	0	
Min. Temp.	33.2	67.9	67.9	
Mo./Hr.	2 10	1 8	1 20	
Day Type	4	2	1	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	443	2	165	0
Feb	401	2	167	0
March	454	2	107	0
April	427	2	41	0
May	478	2	0	0
June	794	5	0	0
July	1,129	5	0	0
Aug	796	5	0	0
Sept	456	5	0	0
Oct	448	2	21	0
Nov	427	2	67	0
Dec	438	2	134	0
Total	6,690	5	700	0

Building Energy Consumption = 27,772 (Btu/Sq Ft/Year)

Source Energy Consumption = 48,415 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

EQUIPMENT ENERGY CONSUMPTION

Trane Air Conditioning Economics

V 600
PAGE 23

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2 WALL & ROOF INSULATION

ELEC 1 1 1 1 0 0 0 0 0 0 1 1 6
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 5.4 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	3.7	67.87
---	--------	----------------------------	-----	-------

Sub Total			3.7	67.87
-----------	--	--	-----	-------

Sub Total			0.0	0.00
-----------	--	--	-----	------

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.34
---	--	------------------------------------	-----	------

Sub Total			0.1	1.34
-----------	--	--	-----	------

Sub Total			0.0	0.00
-----------	--	--	-----	------

Miscellaneous

Lights			1.7	30.79
--------	--	--	-----	-------

Base Utilities			0.0	0.00
----------------	--	--	-----	------

Misc Equipment			0.0	0.00
----------------	--	--	-----	------

Sub Total			1.7	30.79
-----------	--	--	-----	-------

Grand Total			5.4	100.00
-------------	--	--	-----	--------

** **
** TRACE 600 ANALYSIS **
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period: May	To September
System Simulation Period: January	To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	12:50:55 1/24/94
Dataset Name:	CB321 .TM

AIRFLOW - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main				Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)		
1 PTAC		0	1,511	1,511	1,853	341	0
2 RAD		0	0	0	0	530	0
Totals		0	1,511	1,511	1,853	872	0

CAPACITY - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		3.2	0.0	0.0	3.2	-53,271	0	0	0	0	0	0	-53,271
2 RAD		0.0	0.0	0.0	0.0	-82,616	0	0	0	0	0	0	-82,616
Totals		3.2	0.0	0.0	3.2	-135,887	0	0	0	0	0	0	-135,887

The building peaked at hour 16 month 7 with a capacity of 3.0 tons

ENGINEERING CHECKS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	PTAC		0.00	1.14	474.5	415.1	28.91	1.14	-40.30			1,322
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-40.88			2,021

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time =>	Mo/Hr: 7/16		*	Mo/Hr: 7/17		*	Mo/Hr: 13/ 1					
Outside Air =>	OADB/WB/HR: 91/ 73/ 98.0		*	OADB: 89		*	OADB: 4					
			*			*						
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	576	0		576	1.51	*	599	1.98	*	-568	-568	1.08
Glass Solar	7,238	0		7,238	18.94	*	7,707	25.42	*	0	0	0.00
Glass Cond	1,264	0		1,264	3.31	*	1,153	3.80	*	-6,575	-6,575	12.47
Wall Cond	13,215	1,095		14,310	37.44	*	13,690	45.15	*	-19,941	-21,586	40.94
Partition	164			164	0.43	*	164	0.54	*	-229	-229	0.43
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	12,308			12,308	32.20	*	4,827	15.92	*	-23,772	-23,772	45.08
Sub Total=>	34,765	1,095		35,860	93.82	*	28,139	92.80	*	-51,084	-52,729	100.00
Internal Loads						*			*			
Lights	1,296	0		1,296	3.39	*	1,312	4.33	*	0	0	0.00
People	850			850	2.22	*	426	1.40	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total=>	2,146	0	0	2,146	5.61	*	1,738	5.73	*	0	0	0.00
Ceiling Load	377	-377		0	0.00	*	446	1.47	*	-569	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				215	0.56	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total=>	37,288	718	0	38,221	100.00	*	30,323	100.00	*	-51,654	-52,729	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Grains	Leaving DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Gross Total Floor	Glass (sf) Part	(%)
Main Clg	3.2	38.2	30.8	1,511	75.6	62.6	66.5	56.5	54.0	59.9	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Totals	3.2	38.2									

HEATING COIL SELECTION				AIRFLOWS (cfm)				--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA	0.0	Type Clg	Htg Htg		
Main Htg	-53.3	1,511	67.0	99.4	Infil	341	341	Clg Cfm/Sqft	1.14	SADB	56.6	99.4
Aux Htg	0.0	0	0.0	0.0	Supply	1,511	1,511	Clg Cfm/Ton	474.53	Plenum	75.7	66.8
Preheat	-0.0	1,511	67.1	56.4	Mincfm	0	0	Clg Soft/Ton	415.06	Return	75.5	67.1
Reheat	0.0	0	0.0	0.0	Return	1,511	1,511	Clg Btuh/Sqft	28.91	Ret/OA	75.5	67.1
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	3	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-53.3				Auxil	0	0	Htg Cfm/SqFt	1.14	Fn BldTD	0.0	0.0
							Htg Btuh/SqFt	-40.30	Fn Frict	0.1	0.0	

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0 / 0 * Mo/Hr: 0 / 0 * Mo/Hr: 13 / 1

Outside Air ==> OADB/WB/HR: 0 / 0 / 0.0 * OADB: 0 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	*	Space Peak (Btuh)	Coil Peak (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-1,234	-1,234	1.49
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-10,422	-10,422	12.61
Wall Cond	0	0		0	0.00	*	0	0.00	*	-31,588	-33,588	40.66
Partition	0			0	0.00	*	0	0.00	*	-446	-446	0.54
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-36,927	-36,927	44.70
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-80,616	-82,616	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-3,111	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*				0.00	0	0.00
Ret. Fan Heat		0		0	0.00	*				0.00	0	0.00
Duct Heat Pkup		0		0	0.00	*				0.00	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*				0.00	0	0.00
Terminal Bypass		0	0	0	0.00	*				0.00	0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-83,726	-82,616	100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	Floor 2,021		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0 0.0	Part 490		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0 0.0	ExFlr 0		
Totals	0.0	0.0	0	0.0 0.0 0.0 0.0	Roof 678	0	0
					Wall 2,209	277	13

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg	
Main Htg	-82.6	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	530	Clg Cfm/Ton	0.00	Plenum	0.0	65.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-82.6				Auxil	0	0	Htg Btuh/SqFt	-40.88	Fn Frict	0.0	0.0

-----AREAS-----

BUILDING U-VALUES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr		Wintr		Summr		Wintr					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25		
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85		
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74		
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03		
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72		
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09		
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25		
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85		
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74		
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03		
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72		
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09		
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	12.6	5.17		
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.272	0.000	49.1	13.92		
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	21.1	7.12		
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.5	10.07		
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.272	0.000	22.5	7.94		
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37		
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.272	0.568	25.8	8.55		
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.272	0.568	22.1	7.59		
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.272	0.568	21.3	7.39		

BUILDING AREAS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING AREAS -----

Room Number	Description	Floor Flr	Number of Rm	Floor Area/Dupl	Total Room Area (sqft)	Total Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (\$)	Net Wall Area (sqft)
				Duplicate	(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(sqft)	(sqft)
1	DINING ROOM	1	1	181	181	0	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.309 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.249 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 21.47 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.2	10	114	-6,794	11	506	75.6	0	0	0.0	0	0
5 - 10	0.3	12	127	-13,589	14	670	151.1	0	0	0.0	0	0
10 - 15	0.5	5	56	-20,383	13	620	226.7	0	0	0.0	0	0
15 - 20	0.6	4	39	-27,177	19	869	302.3	42	1,530	0.0	0	0
20 - 25	0.8	4	43	-33,972	16	755	377.9	0	0	0.0	0	0
25 - 30	1.0	10	114	-40,766	13	586	453.4	0	0	0.0	0	0
30 - 35	1.1	14	151	-47,560	12	563	529.0	0	0	0.0	0	0
35 - 40	1.3	6	64	-54,355	2	94	604.6	0	0	0.0	0	0
40 - 45	1.4	9	104	-61,149	0	0	680.1	0	0	0.0	0	0
45 - 50	1.6	12	129	-67,944	0	0	755.7	21	765	0.0	0	0
50 - 55	1.8	3	31	-74,738	0	0	831.3	0	0	0.0	0	0
55 - 60	1.9	7	73	-81,532	0	0	906.9	0	0	0.0	0	0
60 - 65	2.1	2	20	-88,327	0	0	982.4	0	0	0.0	0	0
65 - 70	2.2	0	0	-95,121	0	0	1,058.0	0	0	0.0	0	0
70 - 75	2.4	0	0	-101,915	0	0	1,133.6	0	0	0.0	0	0
75 - 80	2.5	0	0	-108,710	0	0	1,209.1	0	0	0.0	0	0
80 - 85	2.7	0	0	-115,504	0	0	1,284.7	0	0	0.0	0	0
85 - 90	2.9	0	0	-122,298	0	0	1,360.3	0	0	0.0	0	0
90 - 95	3.0	0	0	-129,093	0	0	1,435.8	0	0	0.0	0	0
95 - 100	3.2	3	31	-135,887	0	0	1,511.4	38	1,377	0.0	0	0
Hours Off	0.0	0	7,664	0	0	4,097	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number		
Range	1	1	2
Max. Temp.	82.3	100.5	103.6
Mo./Hr.	7 14	7 21	8 20
Day Type	1	1	1
		 Number of Hours
Above 100	0	0	79
95 - 100	0	249	748
90 - 95	0	928	1,340
85 - 90	0	935	882
80 - 85	0	1,066	553
75 - 80	2,512	486	87
70 - 75	1,029	8	524
65 - 70	165	5,088	4,547
60 - 65	710	0	0
55 - 60	800	0	0
50 - 55	770	0	0
Below 50	2,774	0	0
Min. Temp.	31.4	67.9	67.9
Mo./Hr.	2 9	3 20	1 20
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Thrm)	On Peak (Thrm/hr)
Jan	444	2	262	0
Feb	401	2	257	0
March	455	2	167	0
April	427	2	68	0
May	558	6	0	0
June	952	7	0	0
July	1,399	7	0	0
Aug	934	7	0	0
Sept	498	6	0	0
Oct	449	2	53	0
Nov	428	2	116	0
Dec	438	2	222	0
Total	7,381	7	1,144	0

Building Energy Consumption = 41,771 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)

Source Energy Consumption = 68,256 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

ELEC 1 1 1 1 0 0 0 0 0 1 1 1 9
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 6.9 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	5.1	73.95
Sub Total			5.1	73.95
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.87
Sub Total			0.1	1.87
Sub Total			0.0	0.00
Miscellaneous				
Lights			1.7	24.18
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			1.7	24.18
Grand Total			6.9	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	13: 2:48 1/24/94
Dataset Name:	C8321.TM

AIRFLOW - ALTERNATIVE 4
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	777	777	1,062	284	0	0
2 RAD		0	0	0	0	442	0	0
Totals		0	777	777	1,062	726	0	0

CAPACITY - ALTERNATIVE 4
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						Heating Totals (Btuh)	
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Btuh)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		2.0	0.0	0.0	2.0	-30,779	0	0	0	0	0	0	-30,779
2 RAD		0.0	0.0	0.0	0.0	-48,303	0	0	0	0	0	0	-48,303
Totals		2.0	0.0	0.0	2.0	-79,082	0	0	0	0	0	0	-79,082

The building peaked at hour 16 month 7 with a capacity of 2.0 tons

ENGINEERING CHECKS - ALTERNATIVE 4
COMBINED ECOS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent	Cooling				Heating			
				Outside Air	Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft
1 Main	PTAC		0.00	0.59	388.1	660.1	18.18	0.59	-23.28	1,322	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-23.90	2,021	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****				CLG SPACE PEAK *****				HEATING COIL PEAK *****			
Peaked at Time =>	Mo/Hr: 7/16	*	Mo/Hr: 7/17	*	Mo/Hr: 13/ 1	*					
Outside Air =>	OADB/WB/HR: 91/ 73/ 98.0	*	OADB: 89	*	OADB: 4	*					
		*				*					
Envelope Loads	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	545	0		545	2.27	*	623	3.49	*	-568	-568 1.85
Glass Solar	6,632	0		6,632	27.60	*	7,203	40.39	*	0	0 0.00
Glass Cond	1,296	0		1,296	5.39	*	1,264	7.09	*	-6,575	-6,575 21.44
Wall Cond	1,763	155		1,919	7.98	*	1,923	10.78	*	-3,216	-3,485 11.36
Partition	164			164	0.68	*	164	0.92	*	-229	-229 0.75
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0 0.00
Infiltration	11,273			11,273	46.91	*	4,258	23.88	*	-19,810	-19,810 64.60
Sub Total=>	21,674	155		21,829	90.83	*	15,434	86.54	*	-30,397	-30,666 100.00
Internal Loads						*			*		
Lights	1,263	0		1,263	5.25	*	1,633	9.16	*	0	0 0.00
People	832			832	3.46	*	461	2.59	*	0	0 0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sub Total=>	2,094	0	0	2,094	8.71	*	2,095	11.75	*	0	0 0.00
Ceiling Load	108	-108		0	0.00	*	305	1.71	*	-335	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sup. Fan Heat				111	0.46	*		0.00	*		0 0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0 0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0 0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0 0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0 0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0 0.00
Grand Total=>	23,876	47	0	24,034	100.00	*	17,834	100.00	*	-30,732	-30,666 100.00

COOLING COIL SELECTION

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	2.0	24.0	17.0	777 75.2 62.5 66.5	53.8 51.8 55.4	1,322	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0 0.0 0.0	252	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0 0.0 0.0	ExFlr	0
Totals	2.0	24.0			317	0	0
					Wall	1,422	183 13

HEATING COIL SELECTION

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	0.0	Type	Clg	Htg
Main Htg	-30.8	777	67.9	104.3	Infil	284	284	Clg Cfm/Sqft	0.59	SADB	53.9 104.3
Aux Htg	0.0	0	0.0	0.0	Supply	777	777	Clg Cfm/Ton	388.10	Plenum	75.2 67.7
Preheat	-0.0	777	67.8	53.8	Mincfm	0	0	Clg Sqft/Ton	660.07	Return	75.1 67.8
Reheat	0.0	0	0.0	0.0	Return	777	777	Clg Btuh/Sqft	18.18	Ret/OA	75.1 67.8
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	3	Runarnd	75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-30.8				Auxil	0	0	Htg Cfm/SqFt	0.59	Fn BldTD	0.0 0.0
								Htg Btuh/SqFt	-23.28	Fn Frict	0.1 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1

Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-1,234	-1,234	2.55
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-10,422	-10,422	21.58
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,094	-5,429	11.24
Partition	0			0	0.00	*	0	0.00	*	-446	-446	0.92
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-30,772	-30,772	63.71
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-47,967	-48,303	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-1,521	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			*			
Ret. Fan Heat	0			0	0.00	*			*			
Duct Heat Pkup	0			0	0.00	*			*			
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*			*			
Terminal Bypass	0	0		0	0.00	*			*			
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-49,488	-48,303	100.00

COOLING COIL SELECTION

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0 0.0	Part	490	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0 0.0	Roof	678	0 0
Totals	0.0	0.0			Wall	2,209	277 13

HEATING COIL SELECTION

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-48.3	0	0.0	Infil	0	442	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	67.3
Preheat	0.0	0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-48.3			Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
							Htg Btuh/SqFt	-23.90	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
		Summr		Wintr		Summr		Wintr					
		Part.	ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall				
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48	
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05	
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93	
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28	
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77	
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28	
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28	
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48	
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05	
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93	
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28	
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77	
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28	
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	13.2	5.30	
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.044	0.000	52.3	14.55	
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	22.6	7.44	
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.8	10.32	
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.044	0.000	22.9	8.03	
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37	
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.044	0.568	26.7	8.74	
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.044	0.568	23.0	7.78	
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.044	0.568	22.3	7.58	

BUILDING AREAS - ALTERNATIVE 4
COMBINED ECOS

B U I L D I N G A R E A S

Room Number	Description	Floor Duplicate		Area/Dupl (sqft)	Total Room Area (sqft)	Partition Area (sqft)	Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Flr	Rm				Floor Area (sqft)	Area (sqft)						
1	DINING ROOM	1	1	181	181	0	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
COMBINED ECOS

A S H R A E 9 0 A N A L Y S I S

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.110 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.48 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.1	7	73	-3,954	13	587	38.9	0	0	0.0	0	0
5 - 10	0.2	9	94	-7,908	16	688	77.7	0	0	0.0	0	0
10 - 15	0.3	6	62	-11,862	15	636	116.6	0	0	0.0	0	0
15 - 20	0.4	3	30	-15,816	20	873	155.5	42	1,530	0.0	0	0
20 - 25	0.5	6	67	-19,770	15	666	194.3	0	0	0.0	0	0
25 - 30	0.6	8	82	-23,725	13	569	233.2	0	0	0.0	0	0
30 - 35	0.7	16	171	-27,679	8	357	272.0	0	0	0.0	0	0
35 - 40	0.8	8	88	-31,633	0	0	310.9	0	0	0.0	0	0
40 - 45	0.9	4	47	-35,587	0	0	349.8	0	0	0.0	0	0
45 - 50	1.0	10	107	-39,541	0	0	388.6	21	765	0.0	0	0
50 - 55	1.1	13	144	-43,495	0	0	427.5	0	0	0.0	0	0
55 - 60	1.2	1	11	-47,449	0	0	466.4	0	0	0.0	0	0
60 - 65	1.3	4	40	-51,403	0	0	505.2	0	0	0.0	0	0
65 - 70	1.4	2	20	-55,357	0	0	544.1	0	0	0.0	0	0
70 - 75	1.5	1	11	-59,311	0	0	583.0	0	0	0.0	0	0
75 - 80	1.6	0	0	-63,266	0	0	621.8	0	0	0.0	0	0
80 - 85	1.7	0	0	-67,220	0	0	660.7	0	0	0.0	0	0
85 - 90	1.8	0	0	-71,174	0	0	699.6	0	0	0.0	0	0
90 - 95	1.9	0	0	-75,128	0	0	738.4	0	0	0.0	0	0
95 - 100	2.0	3	31	-79,082	0	0	777.3	38	1,377	0.0	0	0
Hours Off	0.0	0	7,682	0	0	4,384	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	Zone Number
-----------------------	---	---	---	-------------

Max. Temp.	80.8	105.5	110.5	
Mo./Hr.	7	14	8	21
Day Type	1	1	1	

	Number of Hours		
Above 100	0	1,232	2,221
95 - 100	0	1,168	707
90 - 95	0	362	70
85 - 90	0	383	348
80 - 85	0	509	394
75 - 80	2,999	18	348
70 - 75	673	85	368
65 - 70	276	5,003	4,304
60 - 65	752	0	0
55 - 60	733	0	0
50 - 55	620	0	0
Below 50	2,707	0	0

Min. Temp.	34.2	67.9	67.9
Mo./Hr.	2	10	2
Day Type	5	2	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Thrm)	On Peak (Thrm/hr)
Jan	443	2	139	0
Feb	400	2	140	0
March	454	2	86	0
April	427	2	29	0
May	487	4	0	0
June	810	5	0	0
July	1,124	5	0	0
Aug	818	5	0	0
Sept	453	5	0	0
Oct	448	2	13	0
Nov	427	2	54	0
Dec	438	2	114	0
Total	6,730	5	574	0

Building Energy Consumption = 24,033 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)

Source Energy Consumption = 43,497 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

EQUIPMENT ENERGY CONSUMPTION

Trane Air Conditioning Economics By: Trane Customer Direct Service Network

V 600
PAGE 47

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

ELEC 1 1 1 0 0 0 0 0 0 0 0 1 1 5
PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 5.1 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	65.68
Sub Total			3.3	65.68
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.1	1.31
Sub Total			0.1	1.31
Sub Total			0.0	0.00

Miscellaneous

Lights	1.7	33.00
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	1.7	33.00
Grand Total	5.1	100.00

Building 330

Trace Input File

933702

CONTENTS OF : E:\CB330.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 330
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/1/1/MEN/105/1//0//10.3
14 20/2/1/WOMEN/87/1//0//10.3
15 20/3/1/ENGR RESOURCES/1062/1//0//10.3
16 20/4/1/OFFICE/135/1//0//10.3
17 20/5/1/ENTRANCE/120/1//0//10.3
18 20/6/2/PRINT ROOM/169/1//0//10.3
19 20/7/2/ENGINEERING/657/1//0//10.3
20 20/8/2/HALL/194/1//0//10.3
21 20/9/2/OFFICE/140/1//0//10.3
22 20/10/2/RECEPTION/105/1//0//10.3
23 20/11/2/OFFICE/293/1//0//10.3
24 20/12/2/SECRETARY/91/1//0//10.3
25 20/13/3/COMPUTER ROOM/361/1//0//10.5
26 21/M///CBADCTX///CBADHTX
27 22/M/1/YES///163
28 22/13/1/YES///163
29 24/1/1/11.75/9//164/180
30 24/1/2/9/9//164/270
31 24/2/1/12/9//164/180
32 24/3/1/22/9//164/90
33 24/3/2/49/9//164/270
34 24/5/1/18/9//165/90
35 24/5/2/7/9//165/180
36 24/6/1/12.5/9//165/0
37 24/6/2/13.5/9//165/270
38 24/7/1/25/9//165/0
39 24/7/2/26/9//165/180
40 24/7/3/10.5/9//165/270
41 24/9/1/15.5/9//165/0
42 24/11/1/18/9//165/0
43 24/11/2/16.5/9//165/90
44 24/12/1/8/9//165/90
45 24/12/2/12/9//165/180
46 24/13/1/19/9.75//166/0
47 24/13/2/19/9.75//166/90
48 24/13/3/19/9.75//166/180
49 25/1/1/5/2/1/1.04/.95
50 25/1/2/5/2/1/1.04/.95
51 25/2/1/5/2/1/1.04/.95
52 25/3/1/5/2/6/1.04/.95
53 25/3/2/5/2/10/1.04/.95
54 25/5/1/3/1.5/4/1.04/.95
55 25/5/2/3/2/1/1.04/.95
56 25/6/1/4/2/2/1.04/.95
57 25/6/2/4/2/2/1.04/.95
58 25/7/1/4/2/6/1.04/.95

CONTENTS OF : E:\CB330.TM

LINE # -----
59 25/7/2/3.5/1.5/3/1.04/.95
60 25/7/3/4/2/1/1.04/.95
61 25/9/1/4/2/3/1.04/.95
62 25/11/1/4/2/4/1.04/.95
63 25/11/2/4/2/4/1.04/.95
64 25/12/1/4/2/1/1.04/.95
65 25/12/2/4/2/3/1.04/.95
66 25/13/1/5/1.5/1/1.04/.95
67 25/13/2/5/1.5/2/1.04/.95
68 25/13/3/5/1.5/1/1.04/.95
69 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/CBADHTG/0FF/CBADP&L/0FF
70 27/1////1.8/WATT-SF/ASHRAE2
71 27/2////2.2/WATT-SF/ASHRAE2
72 27/3/5/PEOPLE/255/255/3.6/WATT-SF/ASHRAE2
73 27/4/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
74 27/6/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
75 27/7/3/PEOPLE/255/255/3.2/WATT-SF/ASHRAE2
76 27/8////4.4/WATT-SF/ASHRAE2
77 27/9/1/PEOPLE/255/255/4.8/WATT-SF/ASHRAE2
78 27/10////2.7/WATT-SF/ASHRAE2
79 27/11/1/PEOPLE/255/255/2.6/WATT-SF/ASHRAE2
80 27/12/1/PEOPLE/255/255/2.1/WATT-SF/ASHRAE2
81 27/13/4/PEOPLE/255/255/1.6/WATT-SF/ASHRAE2
82 28/3/1/PC'S/1.4/WATT-SF/CBADP&L
83 28/4/1/PC'S/1/WATT-SF/CBADP&L
84 28/7/1/PC'S/1/WATT-SF/CBADP&L
85 28/8/1/COPIER/4/WATT-SF/CBADP&L
86 28/9/1/PC'S/1/WATT-SF/CBADP&L
87 28/13/1/PC'S/6.8/WATT-SF/CBADP&L
88 29/M////.26/CFM-SF/.26/CFM-SF
89 30/1/136/CFM//////136/CFM
90 30/2/136/CFM//////136/CFM
91 30/3/1350/CFM
92 30/4/150/CFM
93 30/5/200/CFM
94 30/6/500/CFM
95 30/7/720/CFM
96 30/8/240/CFM
97 30/9/120/CFM
98 30/10/125/CFM
99 30/11/380/CFM
100 30/12/125/CFM
101 30/13/1460/CFM/1460/CFM
102 SYSTEM - 1
103 39/1/BASE BUILDING
104 40/1/SZ
105 41/1/1/2
106 42/1/.5////.1
107 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
108 40/2/RAD
109 41/2/1/2
110 42/2
111 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
112 40/3/COMP
113 41/3/3/3
114 42/3/.2/.2
115 45/3/CBADCLG/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
116 EQUIPMENT - 1

CONTENTS OF : E:\CB330.TM

LINE # -----

117 59/1/CARLISLE///BASE BUILDING
118 60/1/1/BLKPLANT/1/1
119 60/2/2/BLKPLANT/3/3
120 62/1/EQ1161/2/60/MBH
121 62/2/EQ1161/2/24/MBH
122 65/1/1//2/2
123 67/1/EQ2102/1/18/FT-WATER/120/MBH
124 69/1/EQ4003
125 69/3/EQ4003/EQ4003
126 LOAD - 2
127 19/2/WEATHERSTRIP & CAULKING
128 20/1/1/MEN/105/1//0//10.3
129 20/2/1/WOMEN/87/1//0//10.3
130 20/3/1/ENGR RESOURCES/1062/1//0//10.3
131 20/4/1/OFFICE/135/1//0//10.3
132 20/5/1/ENTRANCE/120/1//0//10.3
133 20/6/2/PRINT ROOM/169/1//0//10.3
134 20/7/2/ENGINEERING/657/1//0//10.3
135 20/8/2/HALL/194/1//0//10.3
136 20/9/2/OFFICE/140/1//0//10.3
137 20/10/2/RECEPTION/105/1//0//10.3
138 20/11/2/OFFICE/293/1//0//10.3
139 20/12/2/SECRETARY/91/1//0//10.3
140 20/13/3/COMPUTER ROOM/361/1//0//10.5
141 21/M///CBADCTX///CBADHTX
142 22/M/1/YES///163
143 22/13/1/YES///163
144 24/1/1/11.75/9//164/180
145 24/1/2/9/9//164/270
146 24/2/1/12/9//164/180
147 24/3/1/22/9//164/90
148 24/3/2/49/9//164/270
149 24/5/1/18/9//165/90
150 24/5/2/7/9//165/180
151 24/6/1/12.5/9//165/0
152 24/6/2/13.5/9//165/270
153 24/7/1/25/9//165/0
154 24/7/2/26/9//165/180
155 24/7/3/10.5/9//165/270
156 24/9/1/15.5/9//165/0
157 24/11/1/18/9//165/0
158 24/11/2/16.5/9//165/90
159 24/12/1/8/9//165/90
160 24/12/2/12/9//165/180
161 24/13/1/19/9.75//166/0
162 24/13/2/19/9.75//166/90
163 24/13/3/19/9.75//166/180
164 25/1/1/5/2/1/1.04/.95
165 25/1/2/5/2/1/1.04/.95
166 25/2/1/5/2/1/1.04/.95
167 25/3/1/5/2/6/1.04/.95
168 25/3/2/5/2/10/1.04/.95
169 25/5/1/3/1.5/4/1.04/.95
170 25/5/2/3/2/1/1.04/.95
171 25/6/1/4/2/2/1.04/.95
172 25/6/2/4/2/2/1.04/.95
173 25/7/1/4/2/6/1.04/.95
174 25/7/2/3.5/1.5/3/1.04/.95

CONTENTS OF : E:\CB330.TM

LINE # -----
175 25/7/3/4/2/1/1.04/.95
176 25/9/1/4/2/3/1.04/.95
177 25/11/1/4/2/4/1.04/.95
178 25/11/2/4/2/4/1.04/.95
179 25/12/1/4/2/1/1.04/.95
180 25/12/2/4/2/3/1.04/.95
181 25/13/1/5/1.5/1/1.04/.95
182 25/13/2/5/1.5/2/1.04/.95
183 25/13/3/5/1.5/1/1.04/.95
184 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/CBADHTG/0FF/CBADP&L/0FF
185 27/1////1.8/WATT-SF/ASHRAE2
186 27/2////2.2/WATT-SF/ASHRAE2
187 27/3/5/PEOPLE/255/255/3.6/WATT-SF/ASHRAE2
188 27/4/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
189 27/6/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
190 27/7/3/PEOPLE/255/255/3.2/WATT-SF/ASHRAE2
191 27/8////4.4/WATT-SF/ASHRAE2
192 27/9/1/PEOPLE/255/255/4.8/WATT-SF/ASHRAE2
193 27/10///2.7/WATT-SF/ASHRAE2
194 27/11/1/PEOPLE/255/255/2.6/WATT-SF/ASHRAE2
195 27/12/1/PEOPLE/255/255/2.1/WATT-SF/ASHRAE2
196 27/13/4/PEOPLE/255/255/1.6/WATT-SF/ASHRAE2
197 28/3/1/PC'S/1.4/WATT-SF/CBADP&L
198 28/4/1/PC'S/1/WATT-SF/CBADP&L
199 28/7/1/PC'S/1/WATT-SF/CBADP&L
200 28/8/1/COPIER/4/WATT-SF/CBADP&L
201 28/9/1/PC'S/1/WATT-SF/CBADP&L
202 28/13/1/PC'S/6.8/WATT-SF/CBADP&L
203 29/M////.19/CFM-SF/.19/CFM-SF
204 30/1/136/CFM//////136/CFM
205 30/2/136/CFM//////136/CFM
206 30/3/1350/CFM
207 30/4/150/CFM
208 30/5/200/CFM
209 30/6/500/CFM
210 30/7/720/CFM
211 30/8/240/CFM
212 30/9/120/CFM
213 30/10/125/CFM
214 30/11/380/CFM
215 30/12/125/CFM
216 30/13/1460/CFM/1460/CFM
217 SYSTEM - 2
218 39/2/WEATHERSTRIP & CAULKING
219 40/1/SZ
220 41/1/1/2
221 42/1/.5/////.1
222 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
223 40/2/RAD
224 41/2/1/2
225 42/2
226 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF/0FF
227 40/3/COMP
228 41/3/3/3
229 42/3/.2/.2
230 45/3/CBADCLG/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF/0FF
231 EQUIPMENT - 2
232 59/2/CARLISLE///WEATHERSTRIP & CAULKING

CONTENTS OF : E:\CB330.TM

LINE # -----

233 60/1/1/BLKPLANT/1/1
234 60/2/2/BLKPLANT/3/3
235 62/1/EQ1161/2/60/MBH
236 62/2/EQ1161/2/24/MBH
237 65/1/1//2/2
238 67/1/EQ2102/1/18/FT-WATER/120/MBH
239 69/1/EQ4003
240 69/3/EQ4003/EQ4003
241 LOAD - 3
242 19/3/REPLACE FLUORESCENT LAMPS
243 20/1/1/MEN/105/1//0//10.3
244 20/2/1/WOMEN/87/1//0//10.3
245 20/3/1/ENGR RESOURCES/1062/1//0//10.3
246 20/4/1/OFFICE/135/1//0//10.3
247 20/5/1/ENTRANCE/120/1//0//10.3
248 20/6/2/PRINT ROOM/169/1//0//10.3
249 20/7/2/ENGINEERING/657/1//0//10.3
250 20/8/2/HALL/194/1//0//10.3
251 20/9/2/OFFICE/140/1//0//10.3
252 20/10/2/RECEPTION/105/1//0//10.3
253 20/11/2/OFFICE/293/1//0//10.3
254 20/12/2/SECRETARY/91/1//0//10.3
255 20/13/3/COMPUTER ROOM/361/1//0//10.5
256 21/M///CBADCTX///CBADHTX
257 22/M/1/YES///163
258 22/13/1/YES///163
259 24/1/1/11.75/9//164/180
260 24/1/2/9/9//164/270
261 24/2/1/12/9//164/180
262 24/3/1/22/9//164/90
263 24/3/2/49/9//164/270
264 24/5/1/18/9//165/90
265 24/5/2/7/9//165/180
266 24/6/1/12.5/9//165/0
267 24/6/2/13.5/9//165/270
268 24/7/1/25/9//165/0
269 24/7/2/26/9//165/180
270 24/7/3/10.5/9//165/270
271 24/9/1/15.5/9//165/0
272 24/11/1/18/9//165/0
273 24/11/2/16.5/9//165/90
274 24/12/1/8/9//165/90
275 24/12/2/12/9//165/180
276 24/13/1/19/9.75//166/0
277 24/13/2/19/9.75//166/90
278 24/13/3/19/9.75//166/180
279 25/1/1/5/2/1/1.04/.95
280 25/1/2/5/2/1/1.04/.95
281 25/2/1/5/2/1/1.04/.95
282 25/3/1/5/2/6/1.04/.95
283 25/3/2/5/2/10/1.04/.95
284 25/5/1/3/1.5/4/1.04/.95
285 25/5/2/3/2/1/1.04/.95
286 25/6/1/4/2/2/1.04/.95
287 25/6/2/4/2/2/1.04/.95
288 25/7/1/4/2/6/1.04/.95
289 25/7/2/3.5/1.5/3/1.04/.95
290 25/7/3/4/2/1/1.04/.95

CONTENTS OF : E:\CB330.TM

LINE # -----
291 25/9/1/4/2/3/1.04/.95
292 25/11/1/4/2/4/1.04/.95
293 25/11/2/4/2/4/1.04/.95
294 25/12/1/4/2/1/1.04/.95
295 25/12/2/4/2/3/1.04/.95
296 25/13/1/5/1.5/1/1.04/.95
297 25/13/2/5/1.5/2/1.04/.95
298 25/13/3/5/1.5/1/1.04/.95
299 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/CBADHTG/0FF/CBADP&L/0FF
300 27/1////1.8/WATT-SF/ASHRAE2
301 27/2////2.1/WATT-SF/ASHRAE2
302 27/3/5/PEOPLE/255/255/3.1/WATT-SF/ASHRAE2
303 27/4/1/PEOPLE/255/255/2.7/WATT-SF/ASHRAE2
304 27/6/1/PEOPLE/255/255/2.7/WATT-SF/ASHRAE2
305 27/7/3/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
306 27/8////3.8/WATT-SF/ASHRAE2
307 27/9/1/PEOPLE/255/255/4.0/WATT-SF/ASHRAE2
308 27/10////2.6/WATT-SF/ASHRAE2
309 27/11/1/PEOPLE/255/255/2.2/WATT-SF/ASHRAE2
310 27/12/1/PEOPLE/255/255/2.0/WATT-SF/ASHRAE2
311 27/13/4/PEOPLE/255/255/1.3/WATT-SF/ASHRAE2
312 28/3/1/PC'S/1.4/WATT-SF/CBADP&L
313 28/4/1/PC'S/1/WATT-SF/CBADP&L
314 28/7/1/PC'S/1/WATT-SF/CBADP&L
315 28/8/1/COPIER/4/WATT-SF/CBADP&L
316 28/9/1/PC'S/1/WATT-SF/CBADP&L
317 28/13/1/PC'S/6.8/WATT-SF/CBADP&L
318 29/M////.26/CFM-SF/.26/CFM-SF
319 30/1/136/CFM////////136/CFM
320 30/2/136/CFM////////136/CFM
321 30/3/1350/CFM
322 30/4/150/CFM
323 30/5/200/CFM
324 30/6/500/CFM
325 30/7/720/CFM
326 30/8/240/CFM
327 30/9/120/CFM
328 30/10/125/CFM
329 30/11/380/CFM
330 30/12/125/CFM
331 30/13/1460/CFM/1460/CFM
332 SYSTEM - 3
333 39/3/REPLACE FLUORESCENT LAMPS
334 40/1/SZ
335 41/1/1/2
336 42/1/.5/////.1
337 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
338 40/2/RAD
339 41/2/1/2
340 42/2
341 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF/0FF
342 40/3/COMP
343 41/3/3/3
344 42/3/.2/.2
345 45/3/CBADCLG/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF/0FF
346 EQUIPMENT - 3
347 59/3/CARLISLE///REPLACE FLUORESCENT LAMPS
348 60/1/1/BLKPLANT/1/1

CONTENTS OF : E:\CB330.TM

LINE # -----

349 60/2/2/BLKPLANT/3/3
350 62/1/EQ1161/2/60/MBH
351 62/2/EQ1161/2/24/MBH
352 65/1/1//2/2
353 67/1/EQ2102/1/18/FT-WATER/120/MBH
354 69/1/EQ4003
355 69/3/EQ4003/EQ4003
356 LOAD - 4
357 19/4/REPLACE FLUORESCENT BALLASTS
358 20/1/1/MEN/105/1//0//10.3
359 20/2/1/WOMEN/87/1//0//10.3
360 20/3/1/ENGR RESOURCES/1062/1//0//10.3
361 20/4/1/OFFICE/135/1//0//10.3
362 20/5/1/ENTRANCE/120/1//0//10.3
363 20/6/2/PRINT ROOM/169/1//0//10.3
364 20/7/2/ENGINEERING/657/1//0//10.3
365 20/8/2/HALL/194/1//0//10.3
366 20/9/2/OFFICE/140/1//0//10.3
367 20/10/2/RECEPTION/105/1//0//10.3
368 20/11/2/OFFICE/293/1//0//10.3
369 20/12/2/SECRETARY/91/1//0//10.3
370 20/13/3/COMPUTER ROOM/361/1//0//10.5
371 21/M///CBADCTX///CBADHTX
372 22/M/1/YES///163
373 22/13/1/YES///163
374 24/1/1/11.75/9//164/180
375 24/1/2/9/9//164/270
376 24/2/1/12/9//164/180
377 24/3/1/22/9//164/90
378 24/3/2/49/9//164/270
379 24/5/1/18/9//165/90
380 24/5/2/7/9//165/180
381 24/6/1/12.5/9//165/0
382 24/6/2/13.5/9//165/270
383 24/7/1/25/9//165/0
384 24/7/2/26/9//165/180
385 24/7/3/10.5/9//165/270
386 24/9/1/15.5/9//165/0
387 24/11/1/18/9//165/0
388 24/11/2/16.5/9//165/90
389 24/12/1/8/9//165/90
390 24/12/2/12/9//165/180
391 24/13/1/19/9.75//166/0
392 24/13/2/19/9.75//166/90
393 24/13/3/19/9.75//166/180
394 25/1/1/5/2/1/1.04/.95
395 25/1/2/5/2/1/1.04/.95
396 25/2/1/5/2/1/1.04/.95
397 25/3/1/5/2/6/1.04/.95
398 25/3/2/5/2/10/1.04/.95
399 25/5/1/3/1.5/4/1.04/.95
400 25/5/2/3/2/1/1.04/.95
401 25/6/1/4/2/2/1.04/.95
402 25/6/2/4/2/2/1.04/.95
403 25/7/1/4/2/6/1.04/.95
404 25/7/2/3.5/1.5/3/1.04/.95
405 25/7/3/4/2/1/1.04/.95
406 25/9/1/4/2/3/1.04/.95

CONTENTS OF : E:\CB330.TM

LINE # -----
407 25/11/1/4/2/4/1.04/.95
408 25/11/2/4/2/4/1.04/.95
409 25/12/1/4/2/1/1.04/.95
410 25/12/2/4/2/3/1.04/.95
411 25/13/1/5/1.5/1/1.04/.95
412 25/13/2/5/1.5/2/1.04/.95
413 25/13/3/5/1.5/1/1.04/.95
414 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/CBADHTG/0FF/CBADP&L/0FF
415 27/1////1.5/WATT-SF/ASHRAE2
416 27/2////1.8/WATT-SF/ASHRAE2
417 27/3/5/PEOPLE/255/255/2.6/WATT-SF/ASHRAE2
418 27/4/1/PEOPLE/255/255/2.3/WATT-SF/ASHRAE2
419 27/6/1/PEOPLE/255/255/2.3/WATT-SF/ASHRAE2
420 27/7/3/PEOPLE/255/255/2.4/WATT-SF/ASHRAE2
421 27/8////3.2/WATT-SF/ASHRAE2
422 27/9/1/PEOPLE/255/255/3.4/WATT-SF/ASHRAE2
423 27/10////2.2/WATT-SF/ASHRAE2
424 27/11/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
425 27/12/1/PEOPLE/255/255/1.7/WATT-SF/ASHRAE2
426 27/13/4/PEOPLE/255/255/1.1/WATT-SF/ASHRAE2
427 28/3/1/PC'S/1.4/WATT-SF/CBADP&L
428 28/4/1/PC'S/1/WATT-SF/CBADP&L
429 28/7/1/PC'S/1/WATT-SF/CBADP&L
430 28/8/1/COPIER/4/WATT-SF/CBADP&L
431 28/9/1/PC'S/1/WATT-SF/CBADP&L
432 28/13/1/PC'S/6.8/WATT-SF/CBADP&L
433 29/M///.26/CFM-SF/.26/CFM-SF
434 30/1/136/CFM////////136/CFM
435 30/2/136/CFM////////136/CFM
436 30/3/1350/CFM
437 30/4/150/CFM
438 30/5/200/CFM
439 30/6/500/CFM
440 30/7/720/CFM
441 30/8/240/CFM
442 30/9/120/CFM
443 30/10/125/CFM
444 30/11/380/CFM
445 30/12/125/CFM
446 30/13/1460/CFM/1460/CFM
447 SYSTEM - 4
448 39/4/REPLACE FLUORESCENT BALLASTS
449 40/1/SZ
450 41/1/1/2
451 42/1/.5////.1
452 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
453 40/2/RAD
454 41/2/1/2
455 42/2
456 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
457 40/3/COMP
458 41/3/3/3
459 42/3/.2/.2
460 45/3/CBADCLG/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
461 EQUIPMENT - 4
462 59/4/CARLISLE///REPLACE FLUORESCENT BALLASTS
463 60/1/1/BLKPLANT/1/1
464 60/2/2/BLKPLANT/3/3

CONTENTS OF : E:\CB330.TM

LINE # -----

465 62/1/EQ1161/2/60/MBH
466 62/2/EQ1161/2/24/MBH
467 65/1/1//2/2
468 67/1/EQ2102/1/18/FT-WATER/120/MBH
469 69/1/EQ4003
470 69/3/EQ4003/EQ4003

CONTENTS OF : E:\CB330B.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 330
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/REPLACE FLUORESCENT FIXTURES
13 20/1/1/MEN/105/1//0//10.3
14 20/2/1/WOMEN/87/1//0//10.3
15 20/3/1/ENGR RESOURCES/1062/1//0//10.3
16 20/4/1/OFFICE/135/1//0//10.3
17 20/5/1/ENTRANCE/120/1//0//10.3
18 20/6/2/PRINT ROOM/169/1//0//10.3
19 20/7/2/ENGINEERING/657/1//0//10.3
20 20/8/2/HALL/194/1//0//10.3
21 20/9/2/OFFICE/140/1//0//10.3
22 20/10/2/RECEPTION/105/1//0//10.3
23 20/11/2/OFFICE/293/1//0//10.3
24 20/12/2/SECRETARY/91/1//0//10.3
25 20/13/3/COMPUTER ROOM/361/1//0//10.5
26 21/M///CBADCTX///CBADHTX
27 22/M/1/YES///163
28 22/13/1/YES///163
29 24/1/1/11.75/9//164/180
30 24/1/2/9/9//164/270
31 24/2/1/12/9//164/180
32 24/3/1/22/9//164/90
33 24/3/2/49/9//164/270
34 24/5/1/18/9//165/90
35 24/5/2/7/9//165/180
36 24/6/1/12.5/9//165/0
37 24/6/2/13.5/9//165/270
38 24/7/1/25/9//165/0
39 24/7/2/26/9//165/180
40 24/7/3/10.5/9//165/270
41 24/9/1/15.5/9//165/0
42 24/11/1/18/9//165/0
43 24/11/2/16.5/9//165/90
44 24/12/1/8/9//165/90
45 24/12/2/12/9//165/180
46 24/13/1/19/9.75//166/0
47 24/13/2/19/9.75//166/90
48 24/13/3/19/9.75//166/180
49 25/1/1/5/2/1/1.04/.95
50 25/1/2/5/2/1/1.04/.95
51 25/2/1/5/2/1/1.04/.95
52 25/3/1/5/2/6/1.04/.95
53 25/3/2/5/2/10/1.04/.95
54 25/5/1/3/1.5/4/1.04/.95
55 25/5/2/3/2/1/1.04/.95
56 25/6/1/4/2/2/1.04/.95
57 25/6/2/4/2/2/1.04/.95
58 25/7/1/4/2/6/1.04/.95

CONTENTS OF : E:\CB330B.TM

LINE # -----
59 25/7/2/3.5/1.5/3/1.04/.95
60 25/7/3/4/2/1/1.04/.95
61 25/9/1/4/2/3/1.04/.95
62 25/11/1/4/2/4/1.04/.95
63 25/11/2/4/2/4/1.04/.95
64 25/12/1/4/2/1/1.04/.95
65 25/12/2/4/2/3/1.04/.95
66 25/13/1/5/1.5/1/1.04/.95
67 25/13/2/5/1.5/2/1.04/.95
68 25/13/3/5/1.5/1/1.04/.95
69 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/CBADHTG/0FF/CBADP&L/0FF
70 27/1//11.2/WATT-SF/ASHRAE2
71 27/2//11.5/WATT-SF/ASHRAE2
72 27/3/5/PEOPLE/255/255/2.2/WATT-SF/ASHRAE2
73 27/4/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
74 27/6/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
75 27/7/3/PEOPLE/255/255/2.0/WATT-SF/ASHRAE2
76 27/8//11.2.7/WATT-SF/ASHRAE2
77 27/9/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
78 27/10//11.9/WATT-SF/ASHRAE2
79 27/11/1/PEOPLE/255/255/1.5/WATT-SF/ASHRAE2
80 27/12/1/PEOPLE/255/255/1.4/WATT-SF/ASHRAE2
81 27/13/4/PEOPLE/255/255/0.9/WATT-SF/ASHRAE2
82 28/3/1/PC'S/1.4/WATT-SF/CBADP&L
83 28/4/1/PC'S/1/WATT-SF/CBADP&L
84 28/7/1/PC'S/1/WATT-SF/CBADP&L
85 28/8/1/COPIER/4/WATT-SF/CBADP&L
86 28/9/1/PC'S/1/WATT-SF/CBADP&L
87 28/13/1/PC'S/6.8/WATT-SF/CBADP&L
88 29/M//11.26/CFM-SF/.26/CFM-SF
89 30/1/136/CFM//1136/CFM
90 30/2/136/CFM//1136/CFM
91 30/3/1350/CFM
92 30/4/150/CFM
93 30/5/200/CFM
94 30/6/500/CFM
95 30/7/720/CFM
96 30/8/240/CFM
97 30/9/120/CFM
98 30/10/125/CFM
99 30/11/380/CFM
100 30/12/125/CFM
101 30/13/1460/CFM/1460/CFM
102 SYSTEM - 1
103 39/1/REPLACE FLUORESCENT FIXTURES
104 40/1/SZ
105 41/1/1/2
106 42/1/.5//11.1
107 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
108 40/2/RAD
109 41/2/1/2
110 42/2
111 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
112 40/3/COMP
113 41/3/3/3
114 42/3/.2/.2
115 45/3/CBADCLG/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
116 EQUIPMENT - 1

CONTENTS OF : E:\CB330B.TM

LINE # -----
117 59/1/CARLISLE///REPLACE FLUORESCENT FIXTURES
118 60/1/1/BLKPLANT/1/1
119 60/2/2/BLKPLANT/3/3
120 62/1/EQ1161/2/60/MBH
121 62/2/EQ1161/2/24/MBH
122 65/1/1//2/2
123 67/1/EQ2102/1/18/FT-WATER/120/MBH
124 69/1/EQ4003
125 69/3/EQ4003/EQ4003
126 LOAD - 2
127 19/2/COMBINED ECOS
128 20/1/1/MEN/105/1//0//10.3
129 20/2/1/WOMEN/87/1//0//10.3
130 20/3/1/ENGR RESOURCES/1062/1//0//10.3
131 20/4/1/OFFICE/135/1//0//10.3
132 20/5/1/ENTRANCE/120/1//0//10.3
133 20/6/2/PRINT ROOM/169/1//0//10.3
134 20/7/2/ENGINEERING/657/1//0//10.3
135 20/8/2/HALL/194/1//0//10.3
136 20/9/2/OFFICE/140/1//0//10.3
137 20/10/2/RECEPTION/105/1//0//10.3
138 20/11/2/OFFICE/293/1//0//10.3
139 20/12/2/SECRETARY/91/1//0//10.3
140 20/13/3/COMPUTER ROOM/361/1//0//10.5
141 21/M///CBADCTX///CBADHTX
142 22/M/1/YES///163
143 22/13/1/YES///163
144 24/1/1/11.75/9//164/180
145 24/1/2/9/9//164/270
146 24/2/1/12/9//164/180
147 24/3/1/22/9//164/90
148 24/3/2/49/9//164/270
149 24/5/1/18/9//165/90
150 24/5/2/7/9//165/180
151 24/6/1/12.5/9//165/0
152 24/6/2/13.5/9//165/270
153 24/7/1/25/9//165/0
154 24/7/2/26/9//165/180
155 24/7/3/10.5/9//165/270
156 24/9/1/15.5/9//165/0
157 24/11/1/18/9//165/0
158 24/11/2/16.5/9//165/90
159 24/12/1/8/9//165/90
160 24/12/2/12/9//165/180
161 24/13/1/19/9.75//166/0
162 24/13/2/19/9.75//166/90
163 24/13/3/19/9.75//166/180
164 25/1/1/5/2/1/1.04/.95
165 25/1/2/5/2/1/1.04/.95
166 25/2/1/5/2/1/1.04/.95
167 25/3/1/5/2/6/1.04/.95
168 25/3/2/5/2/10/1.04/.95
169 25/5/1/3/1.5/4/1.04/.95
170 25/5/2/3/2/1/1.04/.95
171 25/6/1/4/2/2/1.04/.95
172 25/6/2/4/2/2/1.04/.95
173 25/7/1/4/2/6/1.04/.95
174 25/7/2/3.5/1.5/3/1.04/.95

CONTENTS OF : E:\CB330B.TM

LINE # -----
175 25/7/3/4/2/1/1.04/.95
176 25/9/1/4/2/3/1.04/.95
177 25/11/1/4/2/4/1.04/.95
178 25/11/2/4/2/4/1.04/.95
179 25/12/1/4/2/1/1.04/.95
180 25/12/2/4/2/3/1.04/.95
181 25/13/1/5/1.5/1/1.04/.95
182 25/13/2/5/1.5/2/1.04/.95
183 25/13/3/5/1.5/1/1.04/.95
184 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/CBADHTG/0FF/CBADP&L/0FF
185 27/1////1.2/WATT-SF/ASHRAE2
186 27/2////1.5/WATT-SF/ASHRAE2
187 27/3/5/PEOPLE/255/255/2.2/WATT-SF/ASHRAE2
188 27/4/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
189 27/6/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
190 27/7/3/PEOPLE/255/255/2.0/WATT-SF/ASHRAE2
191 27/8////2.7/WATT-SF/ASHRAE2
192 27/9/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
193 27/10////1.9/WATT-SF/ASHRAE2
194 27/11/1/PEOPLE/255/255/1.5/WATT-SF/ASHRAE2
195 27/12/1/PEOPLE/255/255/1.4/WATT-SF/ASHRAE2
196 27/13/4/PEOPLE/255/255/0.9/WATT-SF/ASHRAE2
197 28/3/1/PC'S/1.4/WATT-SF/CBADP&L
198 28/4/1/PC'S/1/WATT-SF/CBADP&L
199 28/7/1/PC'S/1/WATT-SF/CBADP&L
200 28/8/1/COPIER/4/WATT-SF/CBADP&L
201 28/9/1/PC'S/1/WATT-SF/CBADP&L
202 28/13/1/PC'S/6.8/WATT-SF/CBADP&L
203 29/M////.19/CFM-SF/.19/CFM-SF
204 30/1/136/CFM//////136/CFM
205 30/2/136/CFM//////136/CFM
206 30/3/1350/CFM
207 30/4/150/CFM
208 30/5/200/CFM
209 30/6/500/CFM
210 30/7/720/CFM
211 30/8/240/CFM
212 30/9/120/CFM
213 30/10/125/CFM
214 30/11/380/CFM
215 30/12/125/CFM
216 30/13/1460/CFM/1460/CFM
217 SYSTEM - 2
218 39/2/COMBINED ECOS
219 40/1/SZ
220 41/1/1/2
221 42/1/.5/////.1
222 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
223 40/2/RAD
224 41/2/1/2
225 42/2
226 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
227 40/3/COMP
228 41/3/3/3
229 42/3/.2/.2
230 45/3/CBADCLG/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
231 EQUIPMENT - 2
232 59/2/CARLISLE///COMBINED ECOS

CONTENTS OF : E:\CB330B.TM

LINE # -----

233 60/1/1/BLKPLANT/1/1
234 60/2/2/BLKPLANT/3/3
235 62/1/EQ1161/2/60/MBH
236 62/2/EQ1161/2/24/MBH
237 65/1/1//2/2
238 67/1/EQ2102/1/18/FT-WATER/120/MBH
239 69/1/EQ4003
240 69/3/EQ4003/EQ4003

Building 330

Trace Output File

933702

**
** T R A C E 6 0 0 A N A L Y S I S **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 330

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20

Air Density:	0.0742	(Lbm/cuft)
Air Specific Heat:	0.2444	(Btu/lbm/F)
Density-Specific Heat Prod:	1.0882	(Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2	(Btu-min./hr/cuft)
Enthalpy Factor:	4.4519	(Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10: 0:19 12/27/93
Dataset Name: CB330 .TM

AIRFLOW - ALTERNATIVE 1
BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	4,182	4,196	4,866	670	0	272
2 RAD		0	0	0	0	670	0	0
3 COMP		0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 1
BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	
1 SZ		7.7	0.0	0.0	7.7	-260,273	0	0	0	0	0	0	-260,273
2 RAD		0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	0	-122,302
3 COMP		1.7	0.0	0.0	1.7	-20,814	0	0	-5,720	0	0	0	-20,814
Totals		9.4	0.0	0.0	9.4	-403,389	0	0	-5,720	0	0	0	-403,389

The building peaked at hour 16 month 7 with a capacity of 9.1 tons

ENGINEERING CHECKS - ALTERNATIVE 1
BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	SZ		0.00	1.32	539.7	407.6	29.44	1.33	-82.42	3,158	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158	
3 Main	COMP		0.00	4.04	870.8	215.3	55.73	4.04	-57.66	361	

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==>						*	Mo/Hr: 7/16			*	Mo/Hr: 13/1	
Outside Air ==>						*	OADB/WB/HR: 91/ 73/ 98.0	OADB: 91	*	OADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	31.17	*	30,911	41.52	*	0	0	0.00
Glass Cond	5,602	0		5,602	6.03	*	5,256	7.06	*	-30,411	-30,411	11.68
Wall Cond	23,116	0		23,116	24.86	*	23,168	31.12	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,084			25,084	26.98	*	9,717	13.05	*	-46,651	-46,651	17.92
Sub Total==>	82,785	0		82,785	89.03	*	69,051	92.75	*	-122,302	-122,302	46.99
Internal Loads						*			*			
Lights	28,215	0		28,215	30.34	*	28,221	37.91	*	0	0	0.00
People	6,217			6,217	6.69	*	2,902	3.90	*	0	0	0.00
Misc	9,778	0	0	9,778	10.52	*	9,778	13.13	*	0	0	0.00
Sub Total==>	44,210	0	0	44,210	47.55	*	40,901	54.94	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.60	*		0.00	*		0	0.00
Ret. Fan Heat				0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup				0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-35,500			-35,500	-38.18	*	-35,500	-47.68	*	-137,970	-137,970	53.01
Exhaust Heat	0	0		0	0.00	*		0.00	*		0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*		0	0.00
Grand Total==>	91,495	0	0	92,982	100.00	*	74,453	100.00	*	-260,272	-260,272	100.00

COOLING COIL SELECTION									AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Leaving DB/WB/HR Deg F	Grains	Deg F	Deg F	Grains	Gross Floor	Total Glass (sf)	(%)
Main Clg	7.7	93.0	74.9	4,182	75.0	62.4	66.5	58.3	54.9	60.6	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0
Totals	7.7	93.0								2,576	438	17

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS		TEMPERATURES (F)			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Cdg	Htg	
Main Htg	-260.3	4,196	68.0	125.0	Infil	670	670	0	Clg Cfm/Sqft	1.32	SADB	58.6 125.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,196	0	Clg Cfm/Ton	539.72	Plenum	75.0 68.0
Preheat	-0.0	4,182	68.0	58.3	MinCfm	0	0	0	Clg Sqft/Ton	407.56	Return	75.0 68.0
Reheat	0.0	0	0.0	0.0	Return	3,987	4,196	No. People	Clg Btuh/Sqft	29.44	Ret/OA	75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	13	Runarnd	75.0 68.0		
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	0.0	Htg % OA	0.0	Fn MtrTD	0.1 0.0
Total	-260.3				Auxil	0	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.1 0.0
							Htg Btuh/SqFt	-82.42	Htg Frict	0.2	Fn Frict	0.2 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 0 / 0 * Mo/Hr: 0 / 0 * Mo/Hr: 13 / 1
 Outside Air ==> OADB/WB/HR: 0 / 0 / 0.0 * OADB: 0 * OADB: 4

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	100.00
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*				0	0.00
Ret. Fan Heat				0	0.00	*				0	0.00
Duct Heat Pkup				0	0.00	*				0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*				0	0.00
Terminal Bypass	0	0		0	0.00	*				0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	Roof	0
Totals	0.0	0.0				2,576	438	17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-122.3	0	0.0	0.0	Infil	0	670	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn MtrTD	0.0	0.0
Total	-122.3				Auxil	0	0	Htg Btuh/SqFt	-38.73	Fn BldTD	0.0	0.0
								Fn Frict	0.0			

System 3 Peak COMP - COMPUTER ROOM UNIT

***** COOLING COIL PEAK *****										CLG SPACE PEAK *****		HEATING COIL PEAK *****	
Peaked at Time ==>					Mo/Hr: 7/14		*		Mo/Hr: 7/16		*		Mo/Hr: 13/ 1
Outside Air ==>					OADB/WB/HR: 91/ 74/105.0		*		OADB: 91		*		OADB: 4
							*			*			
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak (Btu/h)	Coil Peak (Btu/h)	Percent Tot Sens (%)	Percent Of Tot
Envelope Loads													
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Roof Cond	836	0		836	4.15	*	1,050	6.24	*	-904	-904	5.99	
Glass Solar	1,800	0		1,800	8.95	*	1,500	8.91	*	0	0	0.00	
Glass Cond	406	0		406	2.02	*	437	2.59	*	-2,084	-2,084	13.81	
Wall Cond	1,152	0		1,152	5.73	*	1,085	6.45	*	-2,043	-2,043	13.54	
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00	
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00	
Infiltration	4,926			4,926	24.48	*	2,437	14.47	*	-10,063	-10,063	66.67	
Sub Total==>	9,120	0		9,120	45.33	*	6,510	38.65	*	-15,094	-15,094	100.00	
Internal Loads						*			*				
Lights	1,617	0		1,617	8.03	*	1,695	10.07	*	0	0	0.00	
People	1,887			1,887	9.38	*	928	5.51	*	0	0	0.00	
Misc	7,289	0	0	7,289	36.23	*	7,708	45.77	*	0	0	0.00	
Sub Total==>	10,793	0	0	10,793	53.64	*	10,332	61.35	*	0	0	0.00	
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sup. Fan Heat				208	1.03	*		0.00	*		0	0.00	
Ret. Fan Heat				0	0.00	*		0.00	*		0	0.00	
Duct Heat Pkup				0	0.00	*		0.00	*		0	0.00	
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00	
Exhaust Heat	0	0		0	0.00	*		0.00	*		0	0.00	
Terminal Bypass	0	0		0	0.00	*		0.00	*		0	0.00	
Grand Total==>	19,913	0	0	20,120	100.00	*	16,841	100.00	*	-15,094	-15,094	100.00	

-----COOLING COIL SELECTION-----										-----AREAS-----			
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	1.7	20.1	16.6	1,460	75.0	65.1	79.5	64.3	60.9	76.5		361	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		Part	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		ExFlr	0
Totals	1.7	20.1										Roof	361
												Wall	556
													30 5

-----HEATING COIL SELECTION-----					-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	Clg Cfm/Ton 870.77	Type	Clg	Htg	
Main Htg	-20.8	1,460	64.4	77.5	Infil	144	144	Clg Cfm/Ton 870.77	SADB	64.4	77.5	
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Sqft/Ton 215.31	Plenum	75.0	68.0	
Preheat	-0.0	1,460	68.0	64.3	MinCfm	0	1,460	Clg Btuh/Sqft 55.73	Return	75.0	68.0	
Reheat	-5.7	1,460	64.4	68.0	Return	1,460	1,460	No. People 4	Ret/OA	75.0	68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA 0	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt 4.04	Fn MtrID	0.0	0.0	
Total	-20.8				Auxil	0	0	Htg Btuh/SqFt -57.66	Fn BldTD	0.0	0.0	
								Htg Frict 0.1	Fn Frict	0.1	0.1	

BUILDING U-VALUES - ALTERNATIVE 1
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
		(Btu/hr/sqft/F)											
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Wintr Windo	Wall Ceil.				
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13	
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62	
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86	
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63	
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24	
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07	
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53	
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63	
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65	
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57	
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51	
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07	
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13	
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62	
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86	
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63	
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24	
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07	
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53	
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63	
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65	
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57	
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51	
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07	
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33	
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33	
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33	
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87	

BUILDING AREAS - ALTERNATIVE 1
BASE BUILDING

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor		Total		Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Fir	Rm	Area/Dupl Room (sqft)	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)						
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
BASE BUILDING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVW) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	Cooling Load			Heating Load			Cooling Airflow			Heating Airflow		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.5	0	4	-20,455	38	797	282.8	0	0	0.0	0	0
5 - 10	0.9	0	0	-40,911	38	798	565.6	0	0	0.0	0	0
10 - 15	1.4	6	58	-61,366	9	200	848.4	0	0	0.0	0	0
15 - 20	1.9	4	42	-81,822	4	84	1,131.2	0	0	0.0	0	0
20 - 25	2.4	6	60	-102,277	3	57	1,414.0	0	0	0.0	0	0
25 - 30	2.8	2	18	-122,733	9	187	1,696.8	0	0	0.0	0	0
30 - 35	3.3	2	16	-143,188	0	0	1,979.6	0	0	0.0	0	0
35 - 40	3.8	4	42	-163,644	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.2	4	45	-184,099	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.7	2	22	-204,555	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	5	52	-225,010	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	7	76	-245,465	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.1	9	91	-265,921	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.6	10	101	-286,376	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	10	109	-306,832	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.5	6	64	-327,287	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.0	8	89	-347,743	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.5	6	66	-368,198	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	0	0	-388,654	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.4	9	95	-409,109	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,710	0	0	6,637	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	1	2	3	Zone Number
Max. Temp.	89.1	90.7	111.0	117.1	94.9	
Mo./Hr.	7 20	7 21	7 19	7 19	10 17	
Day Type	4	1	2	1	1	
						Number of Hours
Above 100	0	0	2,202	1,176	0	
95 - 100	0	0	467	778	0	
90 - 95	0	0	463	545	85	
85 - 90	467	264	557	577	546	
80 - 85	1,475	1,212	391	376	1,522	
75 - 80	2,150	1,823	160	529	1,963	
70 - 75	379	784	597	645	867	
65 - 70	925	601	1,968	1,378	653	
60 - 65	436	714	831	640	683	
55 - 60	1,441	644	442	725	716	
50 - 55	460	906	682	1,391	540	
Below 50	1,027	1,812	0	0	1,185	
Min. Temp.	39.2	30.4	55.0	55.0	30.6	
Mo./Hr.	2 7	2 9	1 12	1 5	2 9	
Day Type	5	4	3	1	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Thrm)	On Peak (Thrm/hr)
Jan	3,949	20	208	1
Feb	3,575	20	199	1
March	4,308	20	78	1
April	3,738	20	19	1
May	5,368	32	0	0
June	6,223	32	0	0
July	6,328	32	0	0
Aug	6,655	32	0	0
Sept	4,970	32	0	0
Oct	4,111	20	14	1
Nov	3,744	20	51	1
Dec	3,759	20	162	1
Total	56,730	32	731	1

Building Energy Consumption = 39,948 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

Source Energy Consumption = 101,602 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1 BASE BUILDING

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1 BASE BUILDING

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 32.5 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
--------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	24.28
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	10.11
Sub Total			11.2	34.39
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.9	2.76
Sub Total			0.9	2.76
Sub Total			0.0	0.00

Miscellaneous

Lights	20.4	62.85
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	20.4	62.85
Grand Total	32.5	100.00

**
** T R A C E 6 0 0 A N A L Y S I S **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 330

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	10:17:27 12/27/93
Dataset Name:	CB330 .TM

AIRFLOW - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	4,182	4,182	4,671	489	0	272
2 RAD		0	0	0	0	489	0	0
3 COMP		0	1,460	1,460	1,566	106	0	0
Totals		0	5,642	5,642	6,237	1,085	0	272

CAPACITY - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (8tuh)	Aux. Capacity (8tuh)	Preheat Capacity (8tuh)	Reheat Capacity (8tuh)	Humidif. Capacity (8tuh)	Opt. Capacity (8tuh)	Vent. Capacity (8tuh)
1 SZ		7.1	0.0	0.0	7.1	-245,626	0	0	0	0	0	0	-245,626
2 RAD		0.0	0.0	0.0	0.0	-109,743	0	0	0	0	0	0	-109,743
3 COMP		1.6	0.0	0.0	1.6	-17,449	0	0	-5,064	0	0	0	-17,449
Totals		8.7	0.0	0.0	8.7	-372,817	0	0	-5,064	0	0	0	-372,817

The building peaked at hour 16 month 7 with a capacity of 8.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	SZ		0.00	1.32	590.0	445.5	26.93	1.32	-77.78			3,158
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-34.75			3,158
3 Main	COMP		0.00	4.04	932.9	230.7	52.02	4.04	-48.33			361

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	34.07	*	30,911	43.74	*	0	0	0.00
Glass Cond	5,602	0		5,602	6.59	*	5,256	7.44	*	-30,411	-30,411	12.38
Wall Cond	23,116	0		23,116	27.18	*	23,168	32.79	*	-45,240	-45,240	18.42
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	18,330			18,330	21.55	*	7,101	10.05	*	-34,091	-34,091	13.88
Sub Total==>	76,032	0		76,032	89.39	*	66,435	94.01	*	-109,742	-109,742	44.68
Internal Loads						*			*			
Lights	28,215	0		28,215	33.17	*	28,221	39.94	*	0	0	0.00
People	6,217			6,217	7.31	*	2,902	4.11	*	0	0	0.00
Misc	9,778	0	0	9,778	11.50	*	9,778	13.84	*	0	0	0.00
Sub Total==>	44,210	0	0	44,210	51.98	*	40,901	57.88	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.75	*		0.00	*	0	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0	0.00
OV/UNDR Sizing	-36,672			-36,672	-43.11	*	-36,672	-51.90	*	-135,884	-135,884	55.32
Exhaust Heat	0	0		0	0.00	*		0.00	*	0	0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*	0	0	0.00
Grand Total==>	83,570	0	0	85,057	100.00	*	70,665	100.00	*	-245,626	-245,626	100.00

COOLING COIL SELECTION								AREAS			
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Leaving DB/WB/HR	Deg F	Gross Total	Glass (sf)	(%)	
Main Clg	7.1	85.1	70.9	4,182	75.0	62.4	66.5	59.1	55.6	62.0	Part 0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof 0
Totals	7.1	85.1							2,576	438	17

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-245.6	4,182	68.0	122.0	Infil	489	489	0	Clg Cfm/Sqft	1.32	SADB 59.5
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,182	0	Clg Cfm/Ton	590.01	Plenum 75.0
Preheat	-0.0	4,182	68.0	59.1	Mincfm	0	0	0	Clg Sqft/Ton	445.54	Return 68.0
Reheat	0.0	0	0.0	0.0	Return	3,966	4,182	No. People 13	Clg Btuh/Sqft	26.93	Ret/OA 75.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	Htg % OA	0.0	Runarnd 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	0	Htg Cfm/SqFt	1.32	Fn MtrTD 0.1
Total	-245.6				Auxil	0	0	0	Htg Btuh/SqFt	-77.78	Fn BldTD 0.1
									Htg Frict	0.2	Fn Frlct 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
 Outside Air ==> DADB/WB/HR: 0/ 0/ 0.0 * DADB: 0 * DADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	27.71
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	41.22
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-34,091	-34,091	31.06
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-109,742	-109,742	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*				0.00		0.00
Ret. Fan Heat		0		0	0.00	*				0.00		0.00
Duct Heat Pkup		0		0	0.00	*				0.00		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*				0.00		0.00
Terminal Bypass	0	0		0	0.00	*				0.00		0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-109,742	-109,742	100.00

COOLING COIL SELECTION-----								AREAS-----						
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Floor	3,158	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	0.0	0.0										Wall	2,576	438 17

HEATING COIL SELECTION-----				AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-109.7	0	0.0	0.0	Infil	0	489	Clg Cfm/Ton	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn MtrTD	0.0	0.0
Total	-109.7			Auxil	0	0	Htg Btuh/SqFt	-34.75	Fn BldTD	0.0	0.0	
							Htg Frict	0.0	Fn Frict	0.0	0.0	

System 3 Peak COMP - COMPUTER ROOM UNIT

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****												
Peaked at Time ==>	Mo/Hr: 7/14			*	Mo/Hr: 7/16			*	Mo/Hr: 13/1			
Outside Air ==>	OADB/WB/HR: 91/ 74/105.0			*	OADB: 91			*	OADB: 4			
	Space Sens. Sens.+Lat.	Ret. Air (Btu/h)	Ret: Air (Btu/h)	Net Total (Btu/h)	Percent (%)	*	Space Sensible (Btu/h)	Percent (%)	*	Space Peak (Btu/h)	Coil Peak (Btu/h)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.45	*	1,050	6.49	*	-904	-904	7.30
Glass Solar	1,800	0		1,800	9.59	*	1,500	9.27	*	0	0	0.00
Glass Cond	406	0		406	2.16	*	437	2.70	*	-2,084	-2,084	16.83
Wall Cond	1,152	0		1,152	6.14	*	1,085	6.71	*	-2,043	-2,043	16.50
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	3,585			3,585	19.09	*	1,781	11.00	*	-7,354	-7,354	59.38
Sub Total==>	7,779	0		7,779	41.42	*	5,854	36.17	*	-12,385	-12,385	100.00
Internal Loads						*			*			
Lights	1,617	0		1,617	8.61	*	1,695	10.47	*	0	0	0.00
People	1,887			1,887	10.05	*	928	5.73	*	0	0	0.00
Misc	7,289	0	0	7,289	38.81	*	7,708	47.62	*	0	0	0.00
Sub Total==>	10,793	0	0	10,793	57.47	*	10,332	63.83	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.11	*		0.00	*			0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*			0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*		0.00	*			0.00
Terminal Bypass	0	0	0	0	0.00	*		0.00	*			0.00
Grand Total==>	18,572	0	0	18,779	100.00	*	16,185	100.00	*	-12,385	-12,385	100.00

-----COOLING COIL SELECTION-----										-----AREAS-----		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)					
Main Clg	1.6	18.8	16.0	1,460	75.0	65.1	79.6	64.7	61.2	77.3	361	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	361	0 0
Totals	1.6	18.8									556	30 5

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	Type Clg	Htg Htg		
Main Htg	-17.4	1,460	64.8	75.8	Infil	106	106	Clg Cfm/Sqft 4.04	SADB 64.8	75.8	
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Cfm/Ton 932.95	Plenum 75.0	68.0	
Preheat	-0.0	1,460	68.0	64.7	Mincfm	0	1,460	Clg Sqft/Ton 230.68	Return 75.0	68.0	
Reheat	-5.1	1,460	64.8	68.0	Return	1,460	1,460	Clg Btuh/Sqft 52.02	Ret/OA 75.0	68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People 4	Runarnd 75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA 0.0	Fn MtrTD 0.0	0.0	
Total	-17.4				Auxil	0	0	Htg Cfm/Sqft 4.04	Fn BldTD 0.0	0.0	
								Htg Btuh/Sqft -48.33	Fn Frict 0.1	0.1	

BUILDING U-VALUES - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
		Summr ExFlr		Wintr Skylt		Summr Roof		Wintr Windo					
		Part.	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9 49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8 35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0 15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8 4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5 17.24		
	6 PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8 4.07		
	7 ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.53		
	8 HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
	9 OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5 3.63		
	10 RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
	11 OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6 3.65		
	12 SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5 4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.51		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8 10.07		
	1 MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9 49.13		
	2 WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8 35.62		
	3 ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0 15.86		
	4 OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
	5 ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8 4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5 17.24		
	6 PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8 4.07		
	7 ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.53		
	8 HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
	9 OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5 3.63		
	10 RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
	11 OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6 3.65		
	12 SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5 4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.51		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8 10.07		
	13 COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9 6.33		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9 6.33		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9 6.33		
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7 9.87		

BUILDING AREAS - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

- B U I L D I N G A R E A S -

Room Number	Description	Floor		Total		Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Fir	Rm	Area/Dupl (sqft)	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)						
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVW) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.4	0	0	-18,894	40	740	282.1	0	0	0.0	0	0
5 - 10	0.9	1	12	-37,788	34	624	564.2	0	0	0.0	0	0
10 - 15	1.3	1	12	-56,682	10	186	846.3	0	0	0.0	0	0
15 - 20	1.7	1	16	-75,576	5	85	1,128.4	0	0	0.0	0	0
20 - 25	2.2	6	60	-94,470	2	33	1,410.5	0	0	0.0	0	0
25 - 30	2.6	1	12	-113,364	10	180	1,692.6	0	0	0.0	0	0
30 - 35	3.0	4	38	-132,258	0	0	1,974.7	0	0	0.0	0	0
35 - 40	3.5	7	70	-151,152	0	0	2,256.8	0	0	0.0	0	0
40 - 45	3.9	4	40	-170,046	0	0	2,538.9	0	0	0.0	0	0
45 - 50	4.3	0	4	-188,941	0	0	2,821.0	0	0	0.0	0	0
50 - 55	4.8	2	22	-207,835	0	0	3,103.1	0	0	0.0	0	0
55 - 60	5.2	6	60	-226,729	0	0	3,385.2	0	0	0.0	0	0
60 - 65	5.6	8	87	-245,623	0	0	3,667.3	0	0	0.0	0	0
65 - 70	6.1	4	44	-264,517	0	0	3,949.4	0	0	0.0	0	0
70 - 75	6.5	16	175	-283,411	0	0	4,231.5	0	0	0.0	0	0
75 - 80	6.9	6	63	-302,305	0	0	4,513.6	0	0	0.0	0	0
80 - 85	7.4	7	80	-321,199	0	0	4,795.7	0	0	0.0	0	0
85 - 90	7.8	9	98	-340,093	0	0	5,077.8	0	0	0.0	0	0
90 - 95	8.2	3	31	-358,987	0	0	5,359.9	0	0	0.0	0	0
95 - 100	8.7	14	146	-377,881	0	0	5,642.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,690	0	0	6,912	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	1	2	3	Zone Number
Max. Temp.	90.2	91.3	111.0	117.1	98.7	
Mo./Hr.	7	20	7	21	7	19
Day Type	4	1	2	1	1	
						Number of Hours
Above 100	0	0	2,202	1,194	0	
95 - 100	0	0	467	760	85	
90 - 95	36	0	467	563	165	
85 - 90	706	354	587	559	789	
80 - 85	1,483	1,285	369	420	1,655	
75 - 80	1,879	1,899	277	615	2,099	
70 - 75	709	762	716	691	742	
65 - 70	711	594	1,967	1,336	671	
60 - 65	496	672	683	637	696	
55 - 60	1,309	768	435	734	515	
50 - 55	654	850	590	1,251	466	
Below 50	777	1,576	0	0	877	
Min. Temp.	40.6	31.4	55.0	54.9	32.7	
Mo./Hr.	2	7	2	9	1	15
Day Type	5	4	3	2	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	3,946	20	176	1
Feb	3,572	20	164	1
March	4,307	20	59	1
April	3,738	20	12	1
May	5,502	32	0	0
June	6,312	32	0	0
July	6,213	32	0	0
Aug	6,673	32	0	0
Sept	5,068	32	0	0
Oct	4,111	20	8	1
Nov	3,743	20	41	1
Dec	3,757	20	137	1
Total	56,942	32	597	1

Building Energy Consumption = 38,044 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

Source Energy Consumption = 99,245 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 32.5 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp.	Ref.	Equipment	Utility Demand	Per cent Of Tot
Ref.	Num.	Code Name	Equipment Description	(kW) (%)

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	24.29
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	10.08

Sub Total 11.2 34.37

Sub Total 0.0 0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND	0.9	2.76
---	------------------------------------	-----	------

Sub Total 0.9 2.76

Sub Total 0.0 0.00

Miscellaneous

Lights	20.4	62.87
--------	------	-------

Base Utilities	0.0	0.00
----------------	-----	------

Misc Equipment	0.0	0.00
----------------	-----	------

Sub Total 20.4 62.87

Grand Total 32.5 100.00

```
*****  
*****  
**          **  
**      T R A C E   6 0 0   A N A L Y S I S      **  
**          **  
**      by           **  
**          **  
*****  
*****
```

ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 330

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10:34:47 12/27/93
Dataset Name: CB330 .TM

AIRFLOW - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	4,182	4,196	4,866	670	0	272
2 RAD		0	0	0	0	670	0	0
3 COMP		0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating									
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Capacity (Btuh)	Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent. Capacity (Btuh)
1 SZ		7.8	0.0	0.0	0.0	7.8	-260,273	0	0	0	0	0	0	0	-260,273
2 RAD		0.0	0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	0	0	-122,302
3 COMP		1.6	0.0	0.0	0.0	1.6	-20,496	0	0	0	-5,402	0	0	0	-20,496
Totals		9.4	0.0	0.0	0.0	9.4	-403,071	0	0	0	-5,402	0	0	0	-403,071

The building peaked at hour 16 month 7 with a capacity of 9.1 tons

ENGINEERING CHECKS - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Outside Air Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Sq Ft	Sq Ft	
1 Main	SZ		0.00	1.32	536.6	405.2	29.61	1.33	-82.42	3,158		
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158		
3 Main	COMP		0.00	4.04	885.9	219.1	54.78	4.04	-56.78	361		

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	30.99	*	30,911	41.22	*	0	0	0.00
Glass Cond	5,602	0		5,602	5.99	*	5,256	7.01	*	-30,411	-30,411	11.68
Wall Cond	23,116	0		23,116	24.72	*	23,168	30.90	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,084			25,084	26.82	*	9,717	12.96	*	-46,651	-46,651	17.92
Sub Total==>	82,785	0		82,785	88.52	*	69,051	92.08	*	-122,302	-122,302	46.99
Internal Loads						*			*			
Lights	24,816	0		24,816	26.54	*	24,822	33.10	*	0	0	0.00
People	6,217			6,217	6.65	*	2,902	3.87	*	0	0	0.00
Misc	9,778	0	0	9,778	10.46	*	9,778	13.04	*	0	0	0.00
Sub Total==>	40,810	0	0	40,810	43.64	*	37,502	50.01	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.59	*		0.00	*		0	0.00
Ret. Fan Heat				0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup				0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-31,564			-31,564	-33.75	*	-31,564	-42.09	*	-137,970	-137,970	53.01
Exhaust Heat	0	0		0	0.00	*		0.00	*		0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*		0	0.00
Grand Total==>	92,032	0	0	93,519	100.00	*	74,989	100.00	*	-260,272	-260,272	100.00

COOLING COIL SELECTION									AREAS					
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Floor	3,158	
Main Clg	7.8	93.5	75.4	4,182	75.0	62.4	66.5	58.2	54.9	60.6		Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		Roof	0	0
Totals	7.8	93.5										Wall	2,576	438 17

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg		
Main Htg	-260.3	4,196	68.0	125.0	Infil	670	670	0	Clg Cfm/Sqft	1.32	SADB	58.5	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,196	0	Clg Cfm/Ton	536.62	Plenum	75.0	68.0
Preheat	-0.0	4,182	68.0	58.2	Mincfm	0	0	0	Clg Sqft/Ton	405.22	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,987	4,196	No. People	Clg Btuh/Sqft	29.61	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	13	Clg % OA	0.0	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	0	Clg Cfm/SqFt	1.33	Fn MtrTD	0.1	0.0
Total	-260.3				Auxil	0	0	0	Clg Btuh/SqFt	-82.42	Fn BldTD	0.1	0.0
									Fn Frict	0.2	Fn Fric	0.2	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	*	Space Peak (Btuh)	Coil Peak (Btuh)	Percent (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	-122,302	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*				0.00	0	0.00
Ret. Fan Heat				0	0.00	*				0.00	0	0.00
Duct Heat Pkup				0	0.00	*				0.00	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*				0.00	0	0.00
Terminal Bypass	0	0		0	0.00	*				0.00	0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	-122,302	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0	0.0 0.0 0.0	Part	3,158	0
Aux Clg	0.0	0.0	0.0	0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0	0.0 0.0 0.0	Roof	0	0 0
Totals	0.0	0.0				Wall	2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-122.3	0	0.0	0.0	Infil	0	670	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/0A	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-122.3				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-38.73	Fn Frict	0.0	0.0

System 3 Peak COMP - COMPUTER ROOM UNIT

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/14 * Mo/Hr: 7/16 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/ 74/105.0 * OADB: 91 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.23	*	1,050	6.36	*	-904	-904	5.99
Glass Solar	1,800	0		1,800	9.10	*	1,500	9.08	*	0	0	0.00
Glass Cond	406	0		406	2.05	*	437	2.64	*	-2,084	-2,084	13.81
Wall Cond	1,152	0		1,152	5.83	*	1,085	6.57	*	-2,043	-2,043	13.54
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	4,885			4,885	24.70	*	2,437	14.75	*	-10,063	-10,063	66.67
Sub Total==>	9,079	0		9,079	45.91	*	6,510	39.40	*	-15,094	-15,094	100.00
Internal Loads						*			*			
Lights	1,313	0		1,313	6.64	*	1,377	8.34	*	0	0	0.00
People	1,887			1,887	9.54	*	928	5.62	*	0	0	0.00
Misc	7,289	0	0	7,289	36.86	*	7,708	46.65	*	0	0	0.00
Sub Total==>	10,489	0	0	10,489	53.04	*	10,014	60.60	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.05	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*		0.00	*		0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*		0	0.00
Grand Total==>	19,568	0	0	19,776	100.00	*	16,523	100.00	*	-15,094	-15,094	100.00

COOLING COIL SELECTION								AREAS			
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Leaving DB/WB/HR	Deg F	Gross Total	Glass (sf)	(%)	
Main Clg	1.6	19.8	16.3	1,460	75.0	65.2	79.9	64.5	61.0	76.9	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Totals	1.6	19.8							361		
Floor											
Part									0		
ExFlr									0		
Roof									361	0	0
Wall									556	30	5

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-20.5	1,460	64.6	77.5	Infil	144	144	0	Clg Cfm/Sqft	4.04	SADB
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	0	Clg Cfm/Ton	885.92	Plenum
Preheat	-0.0	1,460	68.0	64.5	Mincfm	0	1,460	1,460	Clg Sqft/Ton	219.05	Return
Reheat	-5.4	1,460	64.6	68.0	Return	1,460	1,460	No. People	Clg Btuh/Sqft	54.78	Ret/OA
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	4	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0.0	Htg Cfm/SqFt	4.04	Fn MtrTD
Total	-20.5				Auxil	0	0	Htg Btuh/SqFt	Fn BldTD	0.0	0.0
								-56.78	Fn Frict	0.1	0.1

BUILDING U-VALUES - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Windo		Wintr Windo					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07		
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33		
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87		

BUILDING AREAS - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed			Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Number of Duplicate Flr	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skl Area (sqft)	Net Roof Area (sqft)			
1	MEN	1	1	105	105	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509		0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649		0	0	0	224	16	1,194
System	1 Total/Ave.			3,158		0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509		0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649		0	0	0	224	16	1,194
System	2 Total/Ave.			3,158		0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	361	30	526
Zone	3 Total/Ave.			361		0	0	0	361	30	526
System	3 Total/Ave.			361		0	0	0	361	30	526
Building				6,677		0	0	0	361	905	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTV_r) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTV_w) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.5	0	0	-20,424	40	881	282.8	0	0	0.0	0	0
5 - 10	0.9	6	58	-40,847	35	782	565.6	0	0	0.0	0	0
10 - 15	1.4	0	4	-61,271	9	211	848.4	0	0	0.0	0	0
15 - 20	1.9	5	56	-81,695	5	106	1,131.2	0	0	0.0	0	0
20 - 25	2.4	6	60	-102,118	2	36	1,414.0	0	0	0.0	0	0
25 - 30	2.8	2	16	-122,542	9	208	1,696.8	0	0	0.0	0	0
30 - 35	3.3	0	4	-142,966	0	0	1,979.6	0	0	0.0	0	0
35 - 40	3.8	4	42	-163,389	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.2	4	45	-183,813	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.7	5	52	-204,237	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	7	75	-224,660	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	7	78	-245,084	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.1	7	69	-265,508	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.6	15	159	-285,931	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	7	77	-306,355	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.6	6	65	-326,779	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.0	5	48	-347,202	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.5	4	43	-367,626	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	0	0	-388,050	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.4	9	95	-408,473	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,714	0	0	6,536	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	1	2	3	Zone Number
Max. Temp.	88.9	90.1	109.8	115.5	94.1	
Mo./Hr.	7 21	7 21	7 18	7 19	10 17	
Day Type	4	1	2	1	1	
						Number of Hours
Above 100	0	0	1,952	1,000	0	
95 - 100	0	0	682	722	0	
90 - 95	0	0	401	680	68	
85 - 90	349	226	637	613	432	
80 - 85	1,538	1,250	374	437	1,574	
75 - 80	2,201	1,789	78	415	1,885	
70 - 75	250	724	632	712	918	
65 - 70	1,033	589	1,985	1,354	703	
60 - 65	346	742	878	666	655	
55 - 60	1,441	633	455	767	735	
50 - 55	476	940	686	1,394	557	
Below 50	1,126	1,867	0	0	1,233	
Min. Temp.	39.0	30.4	55.0	55.0	30.5	
Mo./Hr.	2 7	2 9	1 11	1 5	2 9	
Day Type	5	4	3	1	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,469	18	215	1
Feb	3,141	18	207	1
March	3,782	18	84	1
April	3,281	18	20	1
May	4,774	29	0	0
June	5,643	30	0	0
July	5,841	30	0	0
Aug	6,005	30	0	0
Sept	4,438	29	0	0
Oct	3,608	18	16	1
Nov	3,286	18	55	1
Dec	3,303	18	169	1
Total	50,571	30	766	1

Building Energy Consumption = 37,315 (Btu/Sq Ft/Year) Floor Area = 6,677 (Sq Ft)
Source Energy Consumption = 92,843 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3 REPLACE FLUORESCENT LAMPS

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
REPLACE FLUORESCENT LAMPS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 30.0 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp.	Ref.	Equipment		Utility Demand (kW)	Percent Of Tot (%)	
Eqp.	Ref.	Code Name		Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment						
1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	26.32		
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	10.94		
Sub Total				11.2	37.26	
Sub Total				0.0	0.00	
Air Moving Equipment						
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	2.99		
Sub Total				0.9	2.99	
Sub Total				0.0	0.00	
Miscellaneous						
Lights				17.9	59.76	
Base Utilities				0.0	0.00	
Misc Equipment				0.0	0.00	
Sub Total				17.9	59.76	
Grand Total				30.0	100.00	

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 330

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10:52:17 12/27/93
Dataset Name: CB330 .TM

AIRFLOW - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	4,182	4,196	4,866	670	0	272
2 RAD		0	0	0	0	670	0	0
3 COMP		0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Btuh)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	
1 SZ		7.8	0.0	0.0	7.8	-260,273	0	0	0	0	0	0	-260,273
2 RAD		0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	0	-122,302
3 COMP		1.6	0.0	0.0	1.6	-20,289	0	0	-5,194	0	0	0	-20,289
Totals		9.5	0.0	0.0	9.5	-402,864	0	0	-5,194	0	0	0	-402,864

The building peaked at hour 16 month 7 with a capacity of 9.2 tons

ENGINEERING CHECKS - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Outside Air	Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft		
1 Main		SZ	0.00	1.32	533.0	402.5	29.82	1.33	-82.42	3,158		
2 Main		RAD	0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158		
3 Main		COMP	0.00	4.04	896.3	221.6	54.15	4.04	-56.20	361		

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****												
Peaked at Time ==>	Mo/Hr: 7/16			*	Mo/Hr: 7/16			*	Mo/Hr: 13/ 1			
Outside Air ==>	DADB/WB/HR: 91/ 73/ 98.0			*	DADB: 91			*	DADB: 4			
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (\$)
Envelope Loads						*						
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	30.78	*	30,911	40.87	*	0	0	0.00
Glass Cond	5,602	0		5,602	5.95	*	5,256	6.95	*	-30,411	-30,411	11.68
Wall Cond	23,116	0		23,116	24.55	*	23,168	30.63	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,084			25,084	26.64	*	9,717	12.85	*	-46,651	-46,651	17.92
Sub Total==>	82,785	0		82,785	87.92	*	69,051	91.30	*	-122,302	-122,302	46.99
Internal Loads						*			*			
Lights	21,033	0		21,033	22.34	*	21,039	27.82	*	0	0	0.00
People	6,217			6,217	6.60	*	2,902	3.84	*	0	0	0.00
Misc	9,778	0	0	9,778	10.38	*	9,778	12.93	*	0	0	0.00
Sub Total==>	37,028	0	0	37,028	39.32	*	33,718	44.58	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.58	*		0.00	*	0	0	0.00
Ret. Fan Heat				0	0.00	*		0.00	*	0	0	0.00
Duct Heat Pkup				0	0.00	*		0.00	*	0	0	0.00
OV/UNDR Sizing	-27,140			-27,140	-28.82	*	-27,140	-35.89	*	-137,970	-137,970	53.01
Exhaust Heat	0	0	0	0	0.00	*		0.00	*	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*		0.00	*	0	0	0.00
Grand Total==>	92,673	0	0	94,160	100.00	*	75,630	100.00	*	-260,272	-260,272	100.00

COOLING COIL SELECTION										AREAS					
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Floor	3,158		
Main Cig	7.8	94.2	76.1	4,182	75.0	62.4	66.5	58.1	54.8	60.6		Part	0		
Aux Cig	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		ExFlr	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		Roof	0	0	0
Totals	7.8	94.2										Wall	2,576	438	17

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--			--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Cig % OA	0.0	Type	Cig	Htg		
Main Htg	-260.3	4,196	68.0	125.0	Infil	670	670	0	Cig Cfm/Sqft	1.32	SADB	58.4	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,196	0	Cig Cfm/Ton	532.96	Plenum	75.0	68.0
Preheat	-0.0	4,182	68.0	58.1	MinCfm	0	0	0	Cig Sqft/Ton	402.46	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,987	4,196	No. People	Cig Btuh/Sqft	29.82	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.1	0.0	
Total	-260.3				Auxil	0	0	Htg Btuh/SqFt	-82.42	Fn Frict	0.2	0.0	

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
 Outside Air ==> DADB/WB/HR: 0/ 0/ 0.0 * DADB: 0 * DADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	-122,302	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			*			
Ret. Fan Heat				0	0.00	*			*			
Duct Heat Pkup				0	0.00	*			*			
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*			*			
Terminal Bypass	0	0		0	0.00	*			*			
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	-122,302	100.00

COOLING COIL SELECTION								AREAS			
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Gross Total Floor	Glass (sf)	(%)		
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	3,158			
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0		
Totals	0.0	0.0					0.0	Roof	0	0	0
								Wall	2,576	438	17

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)--			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-122.3	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	670	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-122.3			Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0	
				Auxil	0	0	Htg Btuh/SqFt	-38.73	Fn Frict	0.0	0.0	

System 3 Peak COMP - COMPUTER ROOM UNIT

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/14 * Mo/Hr: 7/15 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/ 74/105.0 * OADB: 91 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.28	*	967	5.93	*	-904	-904	5.99
Glass Solar	1,800	0		1,800	9.21	*	1,680	10.30	*	0	0	0.00
Glass Cond	406	0		406	2.08	*	434	2.66	*	-2,084	-2,084	13.81
Wall Cond	1,152	0		1,152	5.90	*	1,143	7.00	*	-2,043	-2,043	13.54
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	4,858			4,858	24.85	*	2,516	15.42	*	-10,063	-10,063	66.67
Sub Total==>	9,052	0		9,052	46.31	*	6,739	41.31	*	-15,094	-15,094	100.00
Internal Loads						*			*			
Lights	1,111	0		1,111	5.69	*	1,138	6.98	*	0	0	0.00
People	1,887			1,887	9.65	*	898	5.50	*	0	0	0.00
Misc	7,289	0	0	7,289	37.29	*	7,540	46.21	*	0	0	0.00
Sub Total==>	10,287	0	0	10,287	52.63	*	9,576	58.69	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.06	*			*			0.00
Ret. Fan Heat		0		0	0.00	*			*			0.00
Duct Heat Pkup		0		0	0.00	*			*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*			*			0.00
Terminal Bypass	0	0	0	0	0.00	*			*			0.00
Grand Total==>	19,339	0	0	19,547	100.00	*	16,316	100.00	*	-15,094	-15,094	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Areas	Glass (sf)	(%)
Main Clg	1.6	19.5	16.1	1,460	75.0 65.3 80.2	64.6 61.1 77.2	Floor	361	
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	1.6	19.5					Roof	361	0 0
							Wall	556	30 5

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-20.3	1,460	64.7	77.5	Infil	0	0	Clg Cfm/Sqft	4.04	SADB	64.7	77.5
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Cfm/Ton	896.32	Plenum	75.0	68.0
Preheat	-0.0	1,460	68.0	64.6	Mincfm	0	1,460	Clg Sqft/Ton	221.62	Return	75.0	68.0
Reheat	-5.2	1,460	64.7	68.0	Return	1,460	1,460	Clg Btuh/Sqft	54.15	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	4	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-20.3				Auxil	0	0	Htg Cfm/SqFt	4.04	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-56.20	Fn Frict	0.1	0.1

BUILDING U-VALUES - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Windo		Wintr Windo					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07		
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33		
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87		

BUILDING AREAS - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

BUILDING AREAS

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value : 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value : 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value : 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTV_R) : 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTV_W) : 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.5	2	24	-20,403	40	924	282.8	0	0	0.0	0	0
5 - 10	0.9	3	34	-40,806	35	803	565.6	0	0	0.0	0	0
10 - 15	1.4	4	40	-61,209	7	172	848.4	0	0	0.0	0	0
15 - 20	1.9	9	96	-81,612	7	164	1,131.2	0	0	0.0	0	0
20 - 25	2.4	0	4	-102,015	1	24	1,414.0	0	0	0.0	0	0
25 - 30	2.8	0	0	-122,417	10	224	1,696.8	0	0	0.0	0	0
30 - 35	3.3	0	0	-142,820	0	0	1,979.6	0	0	0.0	0	0
35 - 40	3.8	8	86	-163,223	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.3	5	50	-183,626	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.7	9	97	-204,029	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	4	40	-224,432	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	14	142	-244,835	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.2	11	114	-265,238	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.6	2	26	-285,641	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	6	65	-306,044	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.6	8	85	-326,447	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.1	5	48	-346,850	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.5	0	0	-367,252	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	4	40	-387,655	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.5	5	55	-408,058	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,714	0	0	6,449	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	1	2	3	Zone Number
Max. Temp.	88.6	89.4	108.5	113.9	93.6	
Mo./Hr.	7 21	7 21	7 19	7 19	10 17	
Day Type	4	1	2	1	1	
						Number of Hours
Above 100	0	0	1,674	792	0	
95 - 100	0	0	851	792	0	
90 - 95	0	0	412	752	51	
85 - 90	319	171	687	613	405	
80 - 85	1,500	1,244	184	489	1,582	
75 - 80	2,265	1,741	292	343	2,005	
70 - 75	200	766	592	696	775	
65 - 70	1,044	553	1,974	1,351	694	
60 - 65	265	789	921	730	703	
55 - 60	1,211	578	483	789	722	
50 - 55	688	906	690	1,413	544	
Below 50	1,268	2,012	0	0	1,279	
Min. Temp.	38.8	30.4	55.0	55.0	30.5	
Mo./Hr.	2 7	2 9	1 11	1 5	2 9	
Day Type	5	4	3	1	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	Qn Peak (Thrm/hr)
Jan	2,945	15	224	1
Feb	2,666	15	216	1
March	3,208	15	91	1
April	2,781	15	22	1
May	4,141	26	0	0
June	4,976	27	0	0
July	5,297	27	0	0
Aug	5,291	27	0	0
Sept	3,853	27	0	0
Oct	3,058	15	18	1
Nov	2,787	15	60	1
Dec	2,804	15	176	1
Total	43,805	27	806	1

Building Energy Consumption = 34,460 (Btu/Sq Ft/Year)
Source Energy Consumption = 83,271 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
REPLACE FLUORESCENT BALLASTS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 27.2 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------	--------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	28.96
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	12.03

Sub Total		11.2	40.99
-----------	--	------	-------

Sub Total		0.0	0.00
-----------	--	-----	------

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND	0.9	3.29
---	------------------------------------	-----	------

Sub Total		0.9	3.29
-----------	--	-----	------

Sub Total		0.0	0.00
-----------	--	-----	------

Miscellaneous

Lights		15.2	55.72
--------	--	------	-------

Base Utilities		0.0	0.00
----------------	--	-----	------

Misc Equipment		0.0	0.00
----------------	--	-----	------

Sub Total		15.2	55.72
-----------	--	------	-------

Grand Total		27.2	100.00
-------------	--	------	--------

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 330

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:53:36 12/27/93
Dataset Name: CB3308.TM

AIRFLOW - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

		Main					Auxil.		Room	
System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)	Room Airflow (Cfm)	
1 SZ		0	4,182	4,196	4,866	670	0	272		
2 RAD		0	0	0	0	670	0	0		
3 COMP		0	1,460	1,460	1,604	144	0	0		
Totals		0	5,642	5,656	6,470	1,484	0	272		

CAPACITY - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

Cooling										Heating				
System Number	System Type	Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)		
1 SZ		7.9	0.0	0.0	7.9	-260,273	0	0	0	0	0	-260,273		
2 RAD		0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	-122,302		
3 COMP		1.6	0.0	0.0	1.6	-20,082	0	0	-4,987	0	0	-20,082		
Totals		9.5	0.0	0.0	9.5	-402,657	0	0	-4,987	0	0	-402,657		

The building peaked at hour 16 month 7 with a capacity of 9.2 tons

ENGINEERING CHECKS - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	SZ		0.00	1.32	529.3	399.7	30.02	1.33	-82.42	3,158	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158	
3 Main	COMP		0.00	4.04	907.0	224.3	53.51	4.04	-55.63	361	

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 7/16			*	Mo/Hr: 7/16			*	Mo/Hr: 13/ 1		
Outside Air ==>	DADB/WB/HR: 91/ 73/ 98.0			*	DADB: 91			*	DADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak (Btuh)	Coil Peak (Btuh)	Percent Tot Sens (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	28,983	0		28,983	30.57	*	30,911	40.53	*	0	0.00
Glass Cond	5,580	0		5,580	5.89	*	5,256	6.89	*	-30,411	-30,411 11.68
Wall Cond	23,076	0		23,076	24.34	*	23,168	30.38	*	-45,240	-45,240 17.38
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	25,257			25,257	26.64	*	9,717	12.74	*	-46,651	-46,651 17.92
Sub Total==>	82,896	0		82,896	87.44	*	69,051	90.54	*	-122,302	-122,302 46.99
Internal Loads						*			*		
Lights	17,488	0		17,488	18.45	*	17,559	23.02	*	0	0.00
People	6,204			6,204	6.54	*	2,902	3.81	*	0	0.00
Misc	9,759	0	0	9,759	10.29	*	9,778	12.82	*	0	0.00
Sub Total==>	33,451	0	0	33,451	35.28	*	30,239	39.65	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				1,487	1.57	*				0	0.00
Ret. Fan Heat				0	0.00	*				0	0.00
Duct Heat Pkup				0	0.00	*				0	0.00
OV/UNDR Sizing	-23,027			-23,027	-24.29	*	-23,027	-30.19	*	-137,970	-137,970 53.01
Exhaust Heat	0	0		0	0.00	*				0	0.00
Terminal Bypass	0	0		0	0.00	*				0	0.00
Grand Total==>	93,320	0	0	94,807	100.00	*	76,263	100.00	*	-260,272	-260,272 100.00

COOLING COIL SELECTION								AREAS					
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	7.9	94.8	76.5	4,182	75.0	62.4	66.5	57.9	54.8	60.6	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0
Totals	7.9	94.8									Wall	2,576	438 17

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--				
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg		
Main Htg	-260.3	4,196	68.0	125.0	Infil	670	670	0	Clg Cfm/Sqft	1.32	SADB	58.2	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,196	0	Clg Cfm/Ton	529.33	Plenum	75.0	68.0
Preheat	-0.0	4,182	68.0	57.9	Mincfm	0	0	0	Clg Sqft/Ton	399.72	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,987	4,196	0	Clg Btuh/Sqft	30.02	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	No. People	13	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-260.3				Auxil	0	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.1	0.0
								0	Htg Btuh/SqFt	-82.42	Fn Frict	0.2	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1		
Outside Air ==>	OADB/WB/HR: 0/ 0/ 0.0			*	OADB: 0			*	OADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Per cent Of Tot (%)	*	Space Sensible (Btu/h)	Per cent Of Tot (%)	Space Peak (Btu/h)	Coil Peak (Btu/h)	Per cent Tot Sens (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	100.00
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat				0	0.00	*			0.00	*	0.00
Duct Heat Pkup				0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*	0.00
Terminal Bypass	0	0		0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Grains	Leaving DB/WB/HR Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	0	0
Totals	0.0	0.0							Wall	2,576	438 17

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-122.3	0	0.0	Infil	0	670	Clg Cfm/Ton	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	MinCfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	No. People	0	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn MtrTD	0.0	0.0
Total	-122.3			Auxil	0	0	Htg Btuh/SqFt	-38.73	Fn BldTD	0.0	0.0
							Htg Frict	0.0	Fn Frict	0.0	0.0

System 3 Peak COMP - COMPUTER ROOM UNIT

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/14 * Mo/Hr: 7/15 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/ 74/105.0 * OADB: 91 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	836	0		836	4.33	*	967	6.00	*	-904	5.99
Glass Solar	1,800	0		1,800	9.32	*	1,680	10.43	*	0	0.00
Glass Cond	406	0		406	2.10	*	434	2.69	*	-2,084	-2,084 13.81
Wall Cond	1,152	0		1,152	5.97	*	1,143	7.09	*	-2,043	-2,043 13.54
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	4,830			4,830	25.00	*	2,516	15.62	*	-10,063	-10,063 66.67
Sub Total==>	9,024	0		9,024	46.71	*	6,739	41.84	*	-15,094	-15,094 100.00
Internal Loads						*			*		
Lights	909	0		909	4.71	*	931	5.78	*	0	0.00
People	1,887			1,887	9.77	*	898	5.57	*	0	0.00
Misc	7,289	0	0	7,289	37.73	*	7,540	46.81	*	0	0.00
Sub Total==>	10,085	0	0	10,085	52.21	*	9,369	58.16	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				208	1.07	*				0	0.00
Ret. Fan Heat				0	0.00	*				0	0.00
Duct Heat Pkup				0	0.00	*				0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat				0	0.00	*				0	0.00
Terminal Bypass				0	0.00	*				0	0.00
						*					
Grand Total==>	19,109	0	0	19,317	100.00	*	16,109	100.00	*	-15,094	-15,094 100.00

COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
Main Clg	1.6	19.3	15.9	1,460	75.0 65.3 80.4	64.7 61.2 77.5	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	361 0 0
Totals	1.6	19.3					Wall	556 30 5

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-20.1	1,460	64.9	77.5	Infil	144	144	Clg Cfm/Sqft	4.04	SADB	64.9	77.5
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Cfm/Ton	906.98	Plenum	75.0	68.0
Preheat	-0.0	1,460	68.0	64.7	Mincfm	0	1,460	Clg Sqft/Ton	224.26	Return	75.0	68.0
Reheat	-5.0	1,460	64.9	68.0	Return	1,460	1,460	Clg Btuh/Sqft	53.51	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	4	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrID	0.0	0.0
Total	-20.1				Auxil	0	0	Htg Cfm/SqFt	4.04	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-55.63	Fn Frict	0.1	0.1

BUILDING U-VALUES - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
		(Btu/hr/sqft/F)											
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Wind o	Wall Ceil.				
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9 49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8 35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0 15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8 4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5 17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8 4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5 3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6 3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5 4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.51		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8 10.07		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9 49.13		
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8 35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0 15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8 4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5 17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8 4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5 3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3 2.67		
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6 3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5 4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9 3.51		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8 10.07		
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9 6.33		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9 6.33		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9 6.33		
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7 9.87		

BUILDING AREAS - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed			Window Area (sqft)	Win (%)	Net Wall Area (sqft)	
		Number of Duplicate Flr	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skylight Area /Rf (sqft)	Skl (%)				
1	MEN	1	1	105	105	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509		0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649		0	0	0	0	224	16	1,194
System	1 Total/Ave.			3,158		0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509		0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649		0	0	0	0	224	16	1,194
System	2 Total/Ave.			3,158		0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	526
Zone	3 Total/Ave.			361		0	0	0	0	361	30	526
System	3 Total/Ave.			361		0	0	0	0	361	30	526
Building				6,677		0	0	0	0	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.5	2	16	-20,382	40	980	282.8	0	0	0.0	0	0
5 - 10	1.0	5	52	-40,764	35	837	565.6	0	0	0.0	0	0
10 - 15	1.4	6	60	-61,147	7	172	848.4	0	0	0.0	0	0
15 - 20	1.9	6	58	-81,529	7	160	1,131.2	0	0	0.0	0	0
20 - 25	2.4	0	4	-101,911	2	48	1,414.0	0	0	0.0	0	0
25 - 30	2.9	2	22	-122,293	2	56	1,696.8	0	0	0.0	0	0
30 - 35	3.3	2	16	-142,675	7	168	1,979.6	0	0	0.0	0	0
35 - 40	3.8	5	48	-163,058	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.3	14	143	-183,440	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.8	4	42	-203,822	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	15	153	-224,204	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	10	101	-244,587	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.2	3	30	-264,969	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.7	4	43	-285,351	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	4	44	-305,733	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.6	9	91	-326,115	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.1	2	20	-346,498	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.6	0	0	-366,880	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	9	95	-387,262	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.5	0	0	-407,644	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,722	0	0	6,339	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number				
Range (F)	1	2	1	2	3
Max. Temp.	88.4	89.3	107.4	112.2	93.1
Mo./Hr.	7 21	7 19	7 19	7 19	10 17
Day Type	4	4	2	1	1
					Number of Hours
Above 100	0	0	1,320	652	0
95 - 100	0	0	1,138	702	0
90 - 95	0	0	315	872	0
85 - 90	299	151	718	642	430
80 - 85	1,429	1,234	266	504	1,594
75 - 80	2,216	1,697	339	340	1,935
70 - 75	176	753	566	597	816
65 - 70	1,076	575	1,996	1,496	678
60 - 65	384	734	898	737	750
55 - 60	914	633	505	730	714
50 - 55	968	760	699	1,488	543
Below 50	1,298	2,223	0	0	1,300
Min. Temp.	38.6	30.3	55.0	54.9	30.5
Mo./Hr.	2 7	2 9	1 11	12 6	2 9
Day Type	5	4	3	1	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	2,461	13	232	1
Feb	2,228	13	224	1
March	2,680	13	98	1
April	2,321	13	24	1
May	3,558	24	0	0
June	4,380	24	0	0
July	4,789	25	0	0
Aug	4,641	24	0	0
Sept	3,316	24	0	0
Oct	2,551	13	20	1
Nov	2,325	13	64	1
Dec	2,345	13	184	1
Total	37,595	25	845	1

Building Energy Consumption = 31,874 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

Source Energy Consumption = 74,532 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
REPLACE FLUORESCENT FIXTURES

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 24.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp.	Ref.	Equipment	Utility Demand	Percnt Of Tot
Num.		Code Name	(kW)	(%)

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	31.91
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	13.25

Sub Total		11.2	45.16
-----------	--	------	-------

Sub Total		0.0	0.00
-----------	--	-----	------

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	3.62
---	--	------------------------------------	-----	------

Sub Total		0.9	3.62
-----------	--	-----	------

Sub Total		0.0	0.00
-----------	--	-----	------

Miscellaneous

Lights		12.7	51.22
--------	--	------	-------

Base Utilities		0.0	0.00
----------------	--	-----	------

Misc Equipment		0.0	0.00
----------------	--	-----	------

Sub Total		12.7	51.22
-----------	--	------	-------

Grand Total		24.7	100.00
-------------	--	------	--------

**
** T R A C E 6 0 0 A N A L Y S I S **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 330

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:10:39 12/27/93
Dataset Name: CB3308 .TM

AIRFLOW - ALTERNATIVE 2
COMBINED ECOS

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	4,132	4,182	4,071	489	0	272
2 RAD		0	0	0	0	489	0	0
3 COMP		0	1,460	1,460	1,566	106	0	0
Totals		0	5,642	5,642	6,237	1,085	0	272

CAPACITY - ALTERNATIVE 2
COMBINED ECOS

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating									
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Capacity (Btuh)	Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent. Capacity (Btuh)
1 SZ		7.2	0.0	0.0	0.0	7.2	-245,626	0	0	0	0	0	0	0	-245,626
2 RAD		0.0	0.0	0.0	0.0	0.0	-109,743	0	0	0	0	0	0	0	-109,743
3 COMP		1.5	0.0	0.0	0.0	1.5	-16,707	0	0	0	-4,322	0	0	0	-16,707
Totals		8.7	0.0	0.0	0.0	8.7	-372,076	0	0	0	-4,322	0	0	0	-372,076

The building peaked at hour 16 month 7 with a capacity of 8.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2
COMBINED ECOS

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Sq Ft	Sq Ft	
1 Main		SZ	0.00	1.32	578.0	436.5	27.49	1.32	-77.78	3,158		
2 Main		RAD	0.00	0.00	0.0	0.0	0.00	0.00	-34.75	3,158		
3 Main		COMP	0.00	4.04	971.5	240.2	49.96	4.04	-46.28	361		

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 7/16			*	Mo/Hr: 7/16			*	Mo/Hr: 13/1		
Outside Air ==>	OADB/WB/HR: 91/ 73/ 98.0			*	OADB: 91			*	OADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak (Btu/h)	Coil Peak (Btu/h)	Percent Tot Sens (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	28,983	0		28,983	33.38	*	30,911	42.68	*	0	0.00
Glass Cond	5,602	0		5,602	6.45	*	5,256	7.26	*	-30,411	-30,411 12.38
Wall Cond	23,116	0		23,116	26.63	*	23,168	31.99	*	-45,240	-45,240 18.42
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	18,330			18,330	21.11	*	7,101	9.80	*	-34,091	-34,091 13.88
Sub Total==>	76,032	0		76,032	87.57	*	66,435	91.73	*	-109,742	-109,742 44.68
Internal Loads						*			*		
Lights	17,555	0		17,555	20.22	*	17,559	24.24	*	0	0.00
People	6,217			6,217	7.16	*	2,902	4.01	*	0	0.00
Misc	9,778	0	0	9,778	11.26	*	9,778	13.50	*	0	0.00
Sub Total==>	33,549	0	0	33,549	38.64	*	30,239	41.75	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				1,487	1.71	*		0.00	*	0	0.00
Ret. Fan Heat				0	0.00	*		0.00	*	0	0.00
Duct Heat Pkup				0	0.00	*		0.00	*	0	0.00
OV/UNDR Sizing	-24,247			-24,247	-27.93	*	-24,247	-33.48	*	-135,884	-135,884 55.32
Exhaust Heat	0	0		0	0.00	*		0.00	*	0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*	0	0.00
Grand Total==>	85,334	0	0	86,821	100.00	*	72,427	100.00	*	-245,626	-245,626 100.00

COOLING COIL SELECTION										AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Floor	3,158
Main Clg	7.2	86.8	72.7	4,182	75.0	62.4	66.5	58.8	55.5	62.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0
Totals	7.2	86.8									Wall	2,576
												438 17

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-245.6	4,182	68.0	122.0	Infil	489	489	0	Clg Cfm/Sqft	1.32	SAD8	59.1 122.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,182	0	Clg Cfm/Ton	578.02	Plenum	75.0 68.0
Preheat	-0.0	4,182	68.0	58.8	MinCfm	0	0	0	Clg Sqft/Ton	436.48	Return	75.0 68.0
Reheat	0.0	0	0.0	0.0	Return	3,966	4,182	No. People	Clg Btuh/Sqft	27.49	Ret/OA	75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	13	Htg % OA	0.0	Fn MtrTD	0.1 0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	0	Htg Cfm/SqFt	1.32	Fn BldTD	0.1 0.0
Total	-245.6				Auxil	0	0	0	Htg Btuh/SqFt	-77.78	Fn Frict	0.2 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1		
Outside Air ==>	DADB/WB/HR: 0/ 0/ 0.0			*	DADB: 0			*	DADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	Space Peak (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (\$)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	27.71
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	41.22
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-34,091	31.06
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-109,742	100.00
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*	0.00
Terminal Bypass	0	0		0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-109,742	100.00

COOLING COIL SELECTION-----								AREAS-----					
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	. Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0
Totals	0.0	0.0									Wall	2,576	438 17

HEATING COIL SELECTION-----				AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-109.7	0	0.0	Infil	0	489	Clg Cfm/Ton	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	No. People	0	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn MtrTD	0.0	0.0
Total	-109.7			Auxil	0	0	Htg Btuh/SqFt	-34.75	Fn BldTD	0.0	0.0
							Htg Frict	0.0	Fn Frict	0.0	0.0

System 3 Peak COMP - COMPUTER ROOM UNIT

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/14 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1
Outside Air ==> DADB/WB/HR: 91/ 74/105.0 * DADB: 91 * DADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.63	*	1,050	6.80	*	-904	-904	7.30
Glass Solar	1,800	0		1,800	9.98	*	1,500	9.71	*	0	0	0.00
Glass Cond	406	0		406	2.25	*	437	2.83	*	-2,084	-2,084	16.83
Wall Cond	1,152	0		1,152	6.39	*	1,085	7.03	*	-2,043	-2,043	16.50
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	3,547			3,547	19.67	*	1,781	11.53	*	-7,354	-7,354	59.38
Sub Total==>	7,741	0		7,741	42.92	*	5,854	37.90	*	-12,385	-12,385	100.00
Internal Loads						*			*			
Lights	909	0		909	5.04	*	954	6.18	*	0	0	0.00
People	1,887			1,887	10.46	*	928	6.01	*	0	0	0.00
Misc	7,289	0	0	7,289	40.42	*	7,708	49.91	*	0	0	0.00
Sub Total==>	10,085	0	0	10,085	55.92	*	9,590	62.10	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.15	*		0.00	*			0.00
Ret. Fan Heat				0	0.00	*		0.00	*			0.00
Duct Heat Pkup				0	0.00	*		0.00	*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*			0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*			0.00
Grand Total==>	17,826	0	0	18,034	100.00	*	15,443	100.00	*	-12,385	-12,385	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Areas
	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Floor	Glass (sf) (%)
Main Clg	1.5	18.0	15.2	1,460	75.0 65.3 80.3	65.1 61.5 78.0	361
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0 0
Totals	1.5	18.0				Roof Wall	361 556 30 5

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	--ENGINEERING CHECKS--	--TEMPERATURES (F)--
	(Mbh)	(cfm)	Deg F	Deg F					
Main Htg	-16.7	1,460	65.3	75.8	Infil	106	106	Clg % OA 0.0	Type Clg 65.3 75.8
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Cfm/Sqft 4.04	SADB 75.0 68.0
Preheat	-0.0	1,460	68.0	65.1	Mincfm	0	1,460	Clg Cfm/Ton 971.51	Plenum 75.0 68.0
Reheat	-4.3	1,460	65.3	68.0	Return	1,460	1,460	Clg Sqft/Ton 240.22	Return 75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Clg Btuh/Sqft 49.96	Ret/OA 75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	No. People 4	Runarnd 75.0 68.0
Total	-16.7				Auxil	0	0	Htg % OA 0.0	Fn MtrTD 0.0 0.0
							0	Htg Cfm/SqFt 4.04	Fn BldTD 0.0 0.0
							0	Htg Btuh/SqFt -46.28	Fn Frict 0.1 0.1

BUILDING U-VALUES - ALTERNATIVE 2
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
		(Btu/hr/sqft/F)				Summr ExFlr	Wintr Skylt	Summr Skylt	Wintr Roof				
		Summr Wintr	Summr Windo	Wintr Windo	Wall Ceil.								
1	MEN	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13		
2	WOMEN	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
9	OFFICE	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
11	OFFICE	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51		
System	1 Total/Ave.	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07		
1	MEN	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13		
2	WOMEN	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62		
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86		
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
5	ENTRANCE	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24		
6	PRINT ROOM	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07		
7	ENGINEERING	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53		
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
9	OFFICE	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63		
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67		
11	OFFICE	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65		
12	SECRETARY	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51		
System	2 Total/Ave.	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07		
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33	
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33	
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33	
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87	

BUILDING AREAS - ALTERNATIVE 2
COMBINED ECOS

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Number of Duplicate	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Area (sqft)						
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509	0	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649	0	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.			3,158	0	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509	0	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649	0	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.			3,158	0	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.			361	0	0	0	0	0	361	30	5	526
System	3 Total/Ave.			361	0	0	0	0	0	361	30	5	526
Building				6,677	0	0	0	0	0	361	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
COMBINED ECOS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours	(%)	Capacity (Btuh)	Hours	(%)	Cap. (Cfm)	Hours	(%)	Cap. (Cfm)	Hours	(%)
0 - 5	0.4	0	0	-18,820	41	894	282.1	0	0	0.0	0	0
5 - 10	0.9	2	16	-37,640	33	724	564.2	0	0	0.0	0	0
10 - 15	1.3	4	42	-56,460	8	186	846.3	0	0	0.0	0	0
15 - 20	1.7	7	76	-75,280	6	137	1,128.4	0	0	0.0	0	0
20 - 25	2.2	5	58	-94,099	1	24	1,410.5	0	0	0.0	0	0
25 - 30	2.6	2	22	-112,919	10	228	1,692.6	0	0	0.0	0	0
30 - 35	3.1	0	0	-131,739	0	0	1,974.7	0	0	0.0	0	0
35 - 40	3.5	4	42	-150,559	0	0	2,256.8	0	0	0.0	0	0
40 - 45	3.9	2	26	-169,379	0	0	2,538.9	0	0	0.0	0	0
45 - 50	4.4	6	59	-188,199	0	0	2,821.0	0	0	0.0	0	0
50 - 55	4.8	6	61	-207,019	0	0	3,103.1	0	0	0.0	0	0
55 - 60	5.2	13	141	-225,839	0	0	3,385.2	0	0	0.0	0	0
60 - 65	5.7	8	90	-244,659	0	0	3,667.3	0	0	0.0	0	0
65 - 70	6.1	4	45	-263,478	0	0	3,949.4	0	0	0.0	0	0
70 - 75	6.6	13	133	-282,298	0	0	4,231.5	0	0	0.0	0	0
75 - 80	7.0	12	131	-301,118	0	0	4,513.6	0	0	0.0	0	0
80 - 85	7.4	2	20	-319,938	0	0	4,795.7	0	0	0.0	0	0
85 - 90	7.9	0	0	-338,758	0	0	5,077.8	0	0	0.0	0	0
90 - 95	8.3	4	40	-357,578	0	0	5,359.9	0	0	0.0	0	0
95 - 100	8.7	6	60	-376,398	0	0	5,642.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,698	0	0	6,567	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	1	2	3	Zone Number
Max. Temp.	89.4	89.8	107.4	112.2	96.7	
Mo./Hr.	7 21	7 19	7 19	7 19	10 17	
Day Type	4	4	2	1	1	
						Number of Hours
Above 100	0	0	1,320	652	0	
95 - 100	0	0	1,138	702	0	
90 - 95	0	0	315	872	168	
85 - 90	364	177	787	678	567	
80 - 85	1,564	1,340	469	472	1,701	
75 - 80	2,160	1,730	79	420	1,864	
70 - 75	237	777	632	698	995	
65 - 70	1,090	538	2,117	1,420	749	
60 - 65	253	744	836	676	712	
55 - 60	1,519	648	456	851	535	
50 - 55	428	863	611	1,319	520	
Below 50	1,145	1,943	0	0	949	
Min. Temp.	39.8	31.2	54.9	54.9	32.6	
Mo./Hr.	2 8	2 9	2 2	1 2	2 9	
Day Type	5	4	5	3	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	2,460	13	198	1
Feb	2,226	13	186	1
March	2,676	13	75	1
April	2,319	13	17	1
May	3,681	24	0	0
June	4,476	24	0	0
July	4,683	25	0	0
Aug	4,774	24	0	0
Sept	3,408	24	0	0
Oct	2,550	13	14	1
Nov	2,325	13	52	1
Dec	2,342	13	157	1
Total	37,920	25	699	1

Building Energy Consumption = 29,858 (Btu/Sq Ft/Year) Floor Area = 6,677 (Sq Ft)
Source Energy Consumption = 72,121 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
COMBINED ECOS

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
COMBINED ECOS

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 24.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp.	Ref.	Equipment	Utility Demand (kW)	Percent Of Tot (%)
	Num.	Code Name	Equipment Description	

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	31.93
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	13.21

Sub Total		11.2	45.14
-----------	--	------	-------

Sub Total		0.0	0.00
-----------	--	-----	------

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	3.62
---	--	------------------------------------	-----	------

Sub Total		0.9	3.62
-----------	--	-----	------

Sub Total		0.0	0.00
-----------	--	-----	------

Miscellaneous

Lights		12.7	51.24
--------	--	------	-------

Base Utilities		0.0	0.00
----------------	--	-----	------

Misc Equipment		0.0	0.00
----------------	--	-----	------

Sub Total		12.7	51.24
-----------	--	------	-------

Grand Total		24.7	100.00
-------------	--	------	--------

Building 400

Trace Input File

933702

CONTENTS OF : E:\CB400.TM

LINE # -----
1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 400
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/1/1/GRND FL OFFICES/1156/1//0//11
14 20/2/1/GUARD OFFICER/231/1//0//10.8
15 20/3/1/CELL BLOCK/459/1//0//10.8
16 20/4/1/DAY ROOM/334/1//0//10.8
17 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
18 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
19 20/7/1/OFFICER/127/1//0//11.2
20 20/8/1/GUARDS DORM/506/1//0//11.2
21 20/9/1/FIREMANS DORM/780/1//0//11.2
22 20/10/1/2ND FL OFFICE/220/1//0//11.2
23 20/11/2/PROVOST MARSHALL/182/1//0//11
24 20/12/2/NCO/110/1//0//11.2
25 20/13/2/GUARDS DORM/251/1//0//11.2
26 20/14/2/TOILETS/300/1//0//11.2
27 20/15/3/TRUCK ROOM/1280/1//0//14.7
28 21/M///CBADCTX///CBADHTX
29 22/1/1/YES///130
30 22/7/1/YES///130
31 22/8/1/YES///130
32 22/9/1/YES///130
33 22/10/1/YES///130
34 22/11/1/YES///130
35 22/12/1/YES///130
36 22/13/1/YES///130
37 22/14/1/YES///130
38 24/1/1/31/10//172/20
39 24/1/2/29/10//172/110
40 24/1/3/48/10//172/200
41 24/2/1/8/10//172/110
42 24/2/2/22/10//172/200
43 24/3/1/27/10//172/20
44 24/3/2/8/10//172/110
45 24/4/1/6/10//172/20
46 24/5/1/7/14.3//172/110
47 24/5/2/44/14.3//172/200
48 24/6/1/22/14.3//172/20
49 24/6/2/7/14.3//172/110
50 24/7/1/11/10.2//172/110
51 24/7/2/11/10.2//172/200
52 24/8/1/22/10.2//172/200
53 24/9/1/23/10.2//172/290
54 24/9/2/33/10.2//172/20
55 24/10/1/22/10.2//172/20
56 24/10/2/10/10.2//172/110
57 24/11/1/17/10//172/20
58 24/12/1/10/10.2//172/200

CONTENTS OF : E:\CB400.TM

LINE # -----
59 24/13/1/10/10.2//172/200
60 24/13/2/24/10.2//172/290
61 24/14/1/26/10.2//172/110
62 24/15/1/43/14.3//172/290
63 24/15/2/33/14.3//172/20
64 25/1/1/4.5/2.5/5/.81/.64
65 25/1/2/4.5/2.5/2/.81/.64
66 25/1/3/4.5/2.5/4/.81/.64
67 25/2/1/4.5/2.5/1/.81/.64
68 25/2/2/4.5/2.5/1/.81/.64
69 25/3/1/4.5/2.5/2/.81/.64
70 25/3/2/4.5/2.5/1/.81/.64
71 25/4/1/4.5/2.5/1/.81/.64
72 25/5/1/6.5/2.5/1/.81/.64
73 25/5/2/55/1/1/.81/.64
74 25/6/1/6.5/2.5/2/.81/.64
75 25/6/2/6.5/2.5/1/.81/.64
76 25/7/1/5.5/2.5/1/.81/.64
77 25/7/2/5.5/2.5/1/.81/.64
78 25/8/1/5.5/2.5/2/.81/.64
79 25/9/1/5.5/2.5/2/.81/.64
80 25/9/2/5.5/2.5/3/.81/.64
81 25/10/1/5.5/2.5/2/.81/.64
82 25/10/2/5.5/2.5/1/.81/.64
83 25/11/1/4.5/2.5/2/.81/.64
84 25/12/1/5.5/2.5/1/.81/.64
85 25/13/1/5.5/2.5/1/.81/.64
86 25/13/2/5.5/2.5/2/.81/.64
87 25/14/1/5.5/2.5/2/.81/.64
88 25/15/1/74/1/1/1.04/1
89 25/15/2/4.5/2.5/3/.81/.64
90 26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
91 27/M/340/SF-PERS/255/255/1.8/WATT-SF
92 29/1/////.38/CFM-SF/.38/CFM-SF
93 29/2/////.38/CFM-SF/.38/CFM-SF
94 29/3/////.38/CFM-SF/.38/CFM-SF
95 29/4/////.38/CFM-SF/.38/CFM-SF
96 29/5/////.38/CFM-SF/.38/CFM-SF
97 29/6/////.38/CFM-SF/.38/CFM-SF
98 29/7/////.38/CFM-SF/.38/CFM-SF
99 29/8/////.38/CFM-SF/.38/CFM-SF
100 29/9/////.38/CFM-SF/.38/CFM-SF
101 29/10/////.38/CFM-SF/.38/CFM-SF
102 29/11////////.38/CFM-SF
103 29/12////////.38/CFM-SF
104 29/13////////.38/CFM-SF
105 29/14////////.38/CFM-SF
106 29/15////////1.17/CFM-SF
107 31/4/1/32/10.3//147/SINE-FIT/80/50
108 SYSTEM - 1
109 39/1/BASE BUILDING
110 40/1/PTAC
111 41/1/1/1
112 42/1/.2
113 45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
114 40/2/RAD
115 41/2/1/2
116 42/2

CONTENTS OF : E:\CB400.TM

LINE # -----
117 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
118 40/3/UH
119 41/3/3/3
120 42/3//.1
121 45/3/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
122 EQUIPMENT - 1
123 59/1/CARLISLE///BASE BUILDING
124 60/1/1/PKPLANT/1/1
125 62/1/EQ1161/14
126 65/1/1//2/3
127 67/1/EQ2102/1
128 69/1/EQ4003
129 69/3//EQ4381
130 LOAD - 2
131 19/2/WALL & ROOF INSULATION
132 20/1/1/GRND FL OFFICES/1156/1//0//11
133 20/2/1/GUARD OFFICER/231/1//0//10.8
134 20/3/1/CELL BLOCK/459/1//0//10.8
135 20/4/1/DAY ROOM/334/1//0//10.8
136 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
137 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
138 20/7/1/OFFICER/127/1//0//11.2
139 20/8/1/GUARDS DORM/506/1//0//11.2
140 20/9/1/FIREMANS DORM/780/1//0//11.2
141 20/10/1/2ND FL OFFICE/220/1//0//11.2
142 20/11/2/PROVOST MARSHALL/182/1//0//11
143 20/12/2/NCO/110/1//0//11.2
144 20/13/2/GUARDS DORM/251/1//0//11.2
145 20/14/2/TOILETS/300/1//0//11.2
146 20/15/3/TRUCK ROOM/1280/1//0//14.7
147 21/M///CBADCTX///CBADHTX
148 22/1/1/YES///118
149 22/7/1/YES///130
150 22/8/1/YES///130
151 22/9/1/YES///130
152 22/10/1/YES///130
153 22/11/1/YES///130
154 22/12/1/YES///130
155 22/13/1/YES///130
156 22/14/1/YES///130
157 24/1/1/31/10//179/20
158 24/1/2/29/10//179/110
159 24/1/3/48/10//179/200
160 24/2/1/8/10//179/110
161 24/2/2/22/10//179/200
162 24/3/1/27/10//179/20
163 24/3/2/8/10//179/110
164 24/4/1/6/10//179/20
165 24/5/1/7/14.3//179/110
166 24/5/2/44/14.3//179/200
167 24/6/1/22/14.3//179/20
168 24/6/2/7/14.3//179/110
169 24/7/1/11/10.2//179/110
170 24/7/2/11/10.2//179/200
171 24/8/1/22/10.2//179/200
172 24/9/1/23/10.2//179/290
173 24/9/2/33/10.2//179/20
174 24/10/1/22/10.2//179/20

CONTENTS OF : E:\CB400.TM

LINE # -----

175 24/10/2/10/10.2//179/110
176 24/11/1/17/10//179/20
177 24/12/1/10/10.2//179/200
178 24/13/1/10/10.2//179/200
179 24/13/2/24/10.2//179/290
180 24/14/1/26/10.2//179/110
181 24/15/1/43/14.3//179/290
182 24/15/2/33/14.3//179/20
183 25/1/1/4.5/2.5/5/.81/.64
184 25/1/2/4.5/2.5/2/.81/.64
185 25/1/3/4.5/2.5/4/.81/.64
186 25/2/1/4.5/2.5/1/.81/.64
187 25/2/2/4.5/2.5/1/.81/.64
188 25/3/1/4.5/2.5/2/.81/.64
189 25/3/2/4.5/2.5/1/.81/.64
190 25/4/1/4.5/2.5/1/.81/.64
191 25/5/1/6.5/2.5/1/.81/.64
192 25/5/2/55/1/1/.81/.64
193 25/6/1/6.5/2.5/2/.81/.64
194 25/6/2/6.5/2.5/1/.81/.64
195 25/7/1/5.5/2.5/1/.81/.64
196 25/7/2/5.5/2.5/1/.81/.64
197 25/8/1/5.5/2.5/2/.81/.64
198 25/9/1/5.5/2.5/2/.81/.64
199 25/9/2/5.5/2.5/3/.81/.64
200 25/10/1/5.5/2.5/2/.81/.64
201 25/10/2/5.5/2.5/1/.81/.64
202 25/11/1/4.5/2.5/2/.81/.64
203 25/12/1/5.5/2.5/1/.81/.64
204 25/13/1/5.5/2.5/1/.81/.64
205 25/13/2/5.5/2.5/2/.81/.64
206 25/14/1/5.5/2.5/2/.81/.64
207 25/15/1/74/1/1/1.04/1
208 25/15/2/4.5/2.5/3/.81/.64
209 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/0FF/0FF/0FF/0FF
210 27/M/340/SF-PERS/255/255/1.8/WATT-SF
211 29/1/////.29/CFM-SF/.29/CFM-SF
212 29/2/////.29/CFM-SF/.29/CFM-SF
213 29/3/////.29/CFM-SF/.29/CFM-SF
214 29/4/////.29/CFM-SF/.29/CFM-SF
215 29/5/////.29/CFM-SF/.29/CFM-SF
216 29/6/////.29/CFM-SF/.29/CFM-SF
217 29/7/////.29/CFM-SF/.29/CFM-SF
218 29/8/////.29/CFM-SF/.29/CFM-SF
219 29/9/////.29/CFM-SF/.29/CFM-SF
220 29/10/////.29/CFM-SF/.29/CFM-SF
221 29/11////////.29/CFM-SF
222 29/12////////.29/CFM-SF
223 29/13////////.29/CFM-SF
224 29/14////////.29/CFM-SF
225 29/15////////1.14/CFM-SF
226 31/4/1/32/10.3//147/SINE-FIT/80/50
227 SYSTEM - 2
228 39/2/WALL & ROOF INSULATION
229 40/1/PTAC
230 41/1/1/1
231 42/1/.2
232 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF

CONTENTS OF : E:\CB400.TM

LINE # -----
233 40/2/RAD
234 41/2/1/2
235 42/2
236 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
237 40/3/UH
238 41/3/3/3
239 42/3//.1
240 45/3/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
241 EQUIPMENT - 2
242 59/2/CARLISLE///WALL & ROOF INSULATION
243 60/1/1/PKPLANT/1/1
244 62/1/EQ1161/14
245 65/1/1//2/3
246 67/1/EQ2102/1
247 69/1/EQ4003
248 69/3//EQ4381
249 LOAD - 3
250 19/3/WEATHERSTRIP & CAULKING
251 20/1/1/GRND FL OFFICES/1156/1//0//11
252 20/2/1/GUARD OFFICER/231/1//0//10.8
253 20/3/1/CELL BLOCK/459/1//0//10.8
254 20/4/1/DAY ROOM/334/1//0//10.8
255 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
256 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
257 20/7/1/OFFICER/127/1//0//11.2
258 20/8/1/GUARDS DORM/506/1//0//11.2
259 20/9/1/FIREMANS DORM/780/1//0//11.2
260 20/10/1/2ND FL OFFICE/220/1//0//11.2
261 20/11/2/PROVOST MARSHALL/182/1//0//11
262 20/12/2/NCO/110/1//0//11.2
263 20/13/2/GUARDS DORM/251/1//0//11.2
264 20/14/2/TOILETS/300/1//0//11.2
265 20/15/3/TRUCK ROOM/1280/1//0//14.7
266 21/M///CBADCTX///CBADHTX
267 22/1/1/YES///130
268 22/7/1/YES///130
269 22/8/1/YES///130
270 22/9/1/YES///130
271 22/10/1/YES///130
272 22/11/1/YES///130
273 22/12/1/YES///130
274 22/13/1/YES///130
275 22/14/1/YES///130
276 24/1/1/31/10//172/20
277 24/1/2/29/10//172/110
278 24/1/3/48/10//172/200
279 24/2/1/8/10//172/110
280 24/2/2/22/10//172/200
281 24/3/1/27/10//172/20
282 24/3/2/8/10//172/110
283 24/4/1/6/10//172/20
284 24/5/1/7/14.3//172/110
285 24/5/2/44/14.3//172/200
286 24/6/1/22/14.3//172/20
287 24/6/2/7/14.3//172/110
288 24/7/1/11/10.2//172/110
289 24/7/2/11/10.2//172/200
290 24/8/1/22/10.2//172/200

CONTENTS OF : E:\CB400.TM

LINE # -----

291 24/9/1/23/10.2//172/290
292 24/9/2/33/10.2//172/20
293 24/10/1/22/10.2//172/20
294 24/10/2/10/10.2//172/110
295 24/11/1/17/10//172/20
296 24/12/1/10/10.2//172/200
297 24/13/1/10/10.2//172/200
298 24/13/2/24/10.2//172/290
299 24/14/1/26/10.2//172/110
300 24/15/1/43/14.3//172/290
301 24/15/2/33/14.3//172/20
302 25/1/1/4.5/2.5/5/.81/.64
303 25/1/2/4.5/2.5/2/.81/.64
304 25/1/3/4.5/2.5/4/.81/.64
305 25/2/1/4.5/2.5/1/.81/.64
306 25/2/2/4.5/2.5/1/.81/.64
307 25/3/1/4.5/2.5/2/.81/.64
308 25/3/2/4.5/2.5/1/.81/.64
309 25/4/1/4.5/2.5/1/.81/.64
310 25/5/1/6.5/2.5/1/.81/.64
311 25/5/2/55/1/1/.81/.64
312 25/6/1/6.5/2.5/2/.81/.64
313 25/6/2/6.5/2.5/1/.81/.64
314 25/7/1/5.5/2.5/1/.81/.64
315 25/7/2/5.5/2.5/1/.81/.64
316 25/8/1/5.5/2.5/2/.81/.64
317 25/9/1/5.5/2.5/2/.81/.64
318 25/9/2/5.5/2.5/3/.81/.64
319 25/10/1/5.5/2.5/2/.81/.64
320 25/10/2/5.5/2.5/1/.81/.64
321 25/11/1/4.5/2.5/2/.81/.64
322 25/12/1/5.5/2.5/1/.81/.64
323 25/13/1/5.5/2.5/1/.81/.64
324 25/13/2/5.5/2.5/2/.81/.64
325 25/14/1/5.5/2.5/2/.81/.64
326 25/15/1/74/1/1/1.04/1
327 25/15/2/4.5/2.5/3/.81/.64
328 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/0FF/0FF/0FF/0FF
329 27/M/340/SF-PERS/255/255/1.8/WATT-SF
330 29/1/////.34/CFM-SF/.34/CFM-SF
331 29/2/////.34/CFM-SF/.34/CFM-SF
332 29/3/////.34/CFM-SF/.34/CFM-SF
333 29/4/////.34/CFM-SF/.34/CFM-SF
334 29/5/////.34/CFM-SF/.34/CFM-SF
335 29/6/////.34/CFM-SF/.34/CFM-SF
336 29/7/////.34/CFM-SF/.34/CFM-SF
337 29/8/////.34/CFM-SF/.34/CFM-SF
338 29/9/////.34/CFM-SF/.34/CFM-SF
339 29/10/////.34/CFM-SF/.34/CFM-SF
340 29/11////////.34/CFM-SF
341 29/12////////.34/CFM-SF
342 29/13////////.34/CFM-SF
343 29/14////////.34/CFM-SF
344 29/15////////.64/CFM-SF
345 31/4/1/32/10.3//147/SINE-FIT/80/50
346 SYSTEM - 3
347 39/3/WEATHERSTRIP & CAULKING
348 40/1/PTAC

CONTENTS OF : E:\CB400.TM

LINE # -----

349 41/1/1/1
350 42/1/.2
351 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
352 40/2/RAD
353 41/2/1/2
354 42/2
355 45/2/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
356 40/3/UH
357 41/3/3/3
358 42/3//.1
359 45/3/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
360 EQUIPMENT - 3
361 59/3/CARLISLE///WEATHERSTRIP & CAULKING
362 60/1/1/PKPLANT/1/1
363 62/1/EQ1161/14
364 65/1/1//2/3
365 67/1/EQ2102/1
366 69/1/EQ4003
367 69/3//EQ4381
368 LOAD - 4
369 19/4/REPLACE FLUORESCENT LAMPS
370 20/1/1/GRND FL OFFICES/1156/1//0//11
371 20/2/1/GUARD OFFICER/231/1//0//10.8
372 20/3/1/CELL BLOCK/459/1//0//10.8
373 20/4/1/DAY ROOM/334/1//0//10.8
374 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
375 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
376 20/7/1/OFFICER/127/1//0//11.2
377 20/8/1/GUARDS DORM/506/1//0//11.2
378 20/9/1/FIREMANS DORM/780/1//0//11.2
379 20/10/1/2ND FL OFFICE/220/1//0//11.2
380 20/11/2/PROVOST MARSHALL/182/1//0//11
381 20/12/2/NCO/110/1//0//11.2
382 20/13/2/GUARDS DORM/251/1//0//11.2
383 20/14/2/TOILETS/300/1//0//11.2
384 20/15/3/TRUCK ROOM/1280/1//0//14.7
385 21/M///CBADCTX///CBADHTX
386 22/1/1/YES///130
387 22/7/1/YES///130
388 22/8/1/YES///130
389 22/9/1/YES///130
390 22/10/1/YES///130
391 22/11/1/YES///130
392 22/12/1/YES///130
393 22/13/1/YES///130
394 22/14/1/YES///130
395 24/1/1/31/10//172/20
396 24/1/2/29/10//172/110
397 24/1/3/48/10//172/200
398 24/2/1/8/10//172/110
399 24/2/2/22/10//172/200
400 24/3/1/27/10//172/20
401 24/3/2/8/10//172/110
402 24/4/1/6/10//172/20
403 24/5/1/7/14.3//172/110
404 24/5/2/44/14.3//172/200
405 24/6/1/22/14.3//172/20
406 24/6/2/7/14.3//172/110

CONTENTS OF : E:\CB400.TM

LINE # -----

407 24/7/1/11/10.2//172/110
408 24/7/2/11/10.2//172/200
409 24/8/1/22/10.2//172/200
410 24/9/1/23/10.2//172/290
411 24/9/2/33/10.2//172/20
412 24/10/1/22/10.2//172/20
413 24/10/2/10/10.2//172/110
414 24/11/1/17/10//172/20
415 24/12/1/10/10.2//172/200
416 24/13/1/10/10.2//172/200
417 24/13/2/24/10.2//172/290
418 24/14/1/26/10.2//172/110
419 24/15/1/43/14.3//172/290
420 24/15/2/33/14.3//172/20
421 25/1/1/4.5/2.5/5/.81/.64
422 25/1/2/4.5/2.5/2/.81/.64
423 25/1/3/4.5/2.5/4/.81/.64
424 25/2/1/4.5/2.5/1/.81/.64
425 25/2/2/4.5/2.5/1/.81/.64
426 25/3/1/4.5/2.5/2/.81/.64
427 25/3/2/4.5/2.5/1/.81/.64
428 25/4/1/4.5/2.5/1/.81/.64
429 25/5/1/6.5/2.5/1/.81/.64
430 25/5/2/55/1/1/.81/.64
431 25/6/1/6.5/2.5/2/.81/.64
432 25/6/2/6.5/2.5/1/.81/.64
433 25/7/1/5.5/2.5/1/.81/.64
434 25/7/2/5.5/2.5/1/.81/.64
435 25/8/1/5.5/2.5/2/.81/.64
436 25/9/1/5.5/2.5/2/.81/.64
437 25/9/2/5.5/2.5/3/.81/.64
438 25/10/1/5.5/2.5/2/.81/.64
439 25/10/2/5.5/2.5/1/.81/.64
440 25/11/1/4.5/2.5/2/.81/.64
441 25/12/1/5.5/2.5/1/.81/.64
442 25/13/1/5.5/2.5/1/.81/.64
443 25/13/2/5.5/2.5/2/.81/.64
444 25/14/1/5.5/2.5/2/.81/.64
445 25/15/1/74/1/1/1.04/1
446 25/15/2/4.5/2.5/3/.81/.64
447 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/0FF/0FF/0FF/0FF
448 27/M/340/SF-PERS/255/255/1.59/WATT-SF
449 29/1/////.38/CFM-SF/.38/CFM-SF
450 29/2/////.38/CFM-SF/.38/CFM-SF
451 29/3/////.38/CFM-SF/.38/CFM-SF
452 29/4/////.38/CFM-SF/.38/CFM-SF
453 29/5/////.38/CFM-SF/.38/CFM-SF
454 29/6/////.38/CFM-SF/.38/CFM-SF
455 29/7/////.38/CFM-SF/.38/CFM-SF
456 29/8/////.38/CFM-SF/.38/CFM-SF
457 29/9/////.38/CFM-SF/.38/CFM-SF
458 29/10/////.38/CFM-SF/.38/CFM-SF
459 29/11/////.38/CFM-SF
460 29/12/////.38/CFM-SF
461 29/13/////.38/CFM-SF
462 29/14/////.38/CFM-SF
463 29/15/////1.17/CFM-SF
464 31/4/1/32/10.3//147/SINE-FIT/80/50

CONTENTS OF : E:\CB400.TM

LINE # -----

465 SYSTEM - 4
466 39/4/REPLACE FLUORESCENT LAMPS
467 40/1/PTAC
468 41/1/1/1
469 42/1/.2
470 45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
471 40/2/RAD
472 41/2/1/2
473 42/2
474 45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF/OFF
475 40/3/UH
476 41/3/3/3
477 42/3//.1
478 45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF/OFF
479 EQUIPMENT - 4
480 59/4/CARLISLE///REPLACE FLUORESCENT LAMPS
481 60/1/1/PKPLANT/1/1
482 62/1/EQ1161/14
483 65/1/1//2/3
484 67/1/EQ2102/1
485 69/1/EQ4003
486 69/3//EQ4381

CONTENTS OF : E:\CB400B.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 400
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/REPLACE FLUORESCENT BALLASTS
13 20/1/1/GRND FL OFFICES/1156/1//0//11
14 20/2/1/GUARD OFFICER/231/1//0//10.8
15 20/3/1/CELL BLOCK/459/1//0//10.8
16 20/4/1/DAY ROOM/334/1//0//10.8
17 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
18 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
19 20/7/1/OFFICER/127/1//0//11.2
20 20/8/1/GUARDS DORM/506/1//0//11.2
21 20/9/1/FIREMANS DORM/780/1//0//11.2
22 20/10/1/2ND FL OFFICE/220/1//0//11.2
23 20/11/2/PROVOST MARSHALL/182/1//0//11
24 20/12/2/NCO/110/1//0//11.2
25 20/13/2/GUARDS DORM/251/1//0//11.2
26 20/14/2/TOILETS/300/1//0//11.2
27 20/15/3/TRUCK ROOM/1280/1//0//14.7
28 21/M///CBADCTX///CBADHTX
29 22/1/1/YES///130
30 22/7/1/YES///130
31 22/8/1/YES///130
32 22/9/1/YES///130
33 22/10/1/YES///130
34 22/11/1/YES///130
35 22/12/1/YES///130
36 22/13/1/YES///130
37 22/14/1/YES///130
38 24/1/1/31/10//172/20
39 24/1/2/29/10//172/110
40 24/1/3/48/10//172/200
41 24/2/1/8/10//172/110
42 24/2/2/22/10//172/200
43 24/3/1/27/10//172/20
44 24/3/2/8/10//172/110
45 24/4/1/6/10//172/20
46 24/5/1/7/14.3//172/110
47 24/5/2/44/14.3//172/200
48 24/6/1/22/14.3//172/20
49 24/6/2/7/14.3//172/110
50 24/7/1/11/10.2//172/110
51 24/7/2/11/10.2//172/200
52 24/8/1/22/10.2//172/200
53 24/9/1/23/10.2//172/290
54 24/9/2/33/10.2//172/20
55 24/10/1/22/10.2//172/20
56 24/10/2/10/10.2//172/110
57 24/11/1/17/10//172/20
58 24/12/1/10/10.2//172/200

CONTENTS OF : E:\CB400B.TM

LINE # -----
59 24/13/1/10/10.2//172/200
60 24/13/2/24/10.2//172/290
61 24/14/1/26/10.2//172/110
62 24/15/1/43/14.3//172/290
63 24/15/2/33/14.3//172/20
64 25/1/1/4.5/2.5/5/.81/.64
65 25/1/2/4.5/2.5/2/.81/.64
66 25/1/3/4.5/2.5/4/.81/.64
67 25/2/1/4.5/2.5/1/.81/.64
68 25/2/2/4.5/2.5/1/.81/.64
69 25/3/1/4.5/2.5/2/.81/.64
70 25/3/2/4.5/2.5/1/.81/.64
71 25/4/1/4.5/2.5/1/.81/.64
72 25/5/1/6.5/2.5/1/.81/.64
73 25/5/2/55/1/1/.81/.64
74 25/6/1/6.5/2.5/2/.81/.64
75 25/6/2/6.5/2.5/1/.81/.64
76 25/7/1/5.5/2.5/1/.81/.64
77 25/7/2/5.5/2.5/1/.81/.64
78 25/8/1/5.5/2.5/2/.81/.64
79 25/9/1/5.5/2.5/2/.81/.64
80 25/9/2/5.5/2.5/3/.81/.64
81 25/10/1/5.5/2.5/2/.81/.64
82 25/10/2/5.5/2.5/1/.81/.64
83 25/11/1/4.5/2.5/2/.81/.64
84 25/12/1/5.5/2.5/1/.81/.64
85 25/13/1/5.5/2.5/1/.81/.64
86 25/13/2/5.5/2.5/2/.81/.64
87 25/14/1/5.5/2.5/2/.81/.64
88 25/15/1/74/1/1/1.04/1
89 25/15/2/4.5/2.5/3/.81/.64
90 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/0FF/0FF/0FF/0FF
91 27/M/340/SF-PERS/255/255/1.35/WATT-SF
92 29/1/////.38/CFM-SF/.38/CFM-SF
93 29/2/////.38/CFM-SF/.38/CFM-SF
94 29/3/////.38/CFM-SF/.38/CFM-SF
95 29/4/////.38/CFM-SF/.38/CFM-SF
96 29/5/////.38/CFM-SF/.38/CFM-SF
97 29/6/////.38/CFM-SF/.38/CFM-SF
98 29/7/////.38/CFM-SF/.38/CFM-SF
99 29/8/////.38/CFM-SF/.38/CFM-SF
100 29/9/////.38/CFM-SF/.38/CFM-SF
101 29/10/////.38/CFM-SF/.38/CFM-SF
102 29/11////////.38/CFM-SF
103 29/12////////.38/CFM-SF
104 29/13////////.38/CFM-SF
105 29/14////////.38/CFM-SF
106 29/15////////1.17/CFM-SF
107 31/4/1/32/10.3//147/SINE-FIT/80/50
108 SYSTEM - 1
109 39/1/REPLACE FLUORESCENT BALLASTS
110 40/1/PTAC
111 41/1/1/1
112 42/1/.2
113 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
114 40/2/RAD
115 41/2/1/2
116 42/2

CONTENTS OF : E:\CB400B.TM

LINE # -----
117 45/2/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
118 40/3/UH
119 41/3/3/3
120 42/3//.1
121 45/3/0FF/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
122 EQUIPMENT - 1
123 59/1/CARLISLE///REPLACE FLUORESCENT BALLASTS
124 60/1/1/PKPLANT/1/1
125 62/1/EQ1161/14
126 65/1/1//2/3
127 67/1/EQ2102/1
128 69/1/EQ4003
129 69/3//EQ4381
130 LOAD - 2
131 19/2/REPLACE FLUORESCENT FIXTURES
132 20/1/1/GRND FL OFFICES/1156/1//0//11
133 20/2/1/GUARD OFFICER/231/1//0//10.8
134 20/3/1/CELL BLOCK/459/1//0//10.8
135 20/4/1/DAY ROOM/334/1//0//10.8
136 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
137 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
138 20/7/1/OFFICER/127/1//0//11.2
139 20/8/1/GUARDS DORM/506/1//0//11.2
140 20/9/1/FIREMANS DORM/780/1//0//11.2
141 20/10/1/2ND FL OFFICE/220/1//0//11.2
142 20/11/2/PROVOST MARSHALL/182/1//0//11
143 20/12/2/NCO/110/1//0//11.2
144 20/13/2/GUARDS DORM/251/1//0//11.2
145 20/14/2/TOILETS/300/1//0//11.2
146 20/15/3/TRUCK ROOM/1280/1//0//14.7
147 21/M///CBADCTX///CBADHTX
148 22/1/1/YES///130
149 22/7/1/YES///130
150 22/8/1/YES///130
151 22/9/1/YES///130
152 22/10/1/YES///130
153 22/11/1/YES///130
154 22/12/1/YES///130
155 22/13/1/YES///130
156 22/14/1/YES///130
157 24/1/1/31/10//172/20
158 24/1/2/29/10//172/110
159 24/1/3/48/10//172/200
160 24/2/1/8/10//172/110
161 24/2/2/22/10//172/200
162 24/3/1/27/10//172/20
163 24/3/2/8/10//172/110
164 24/4/1/6/10//172/20
165 24/5/1/7/14.3//172/110
166 24/5/2/44/14.3//172/200
167 24/6/1/22/14.3//172/20
168 24/6/2/7/14.3//172/110
169 24/7/1/11/10.2//172/110
170 24/7/2/11/10.2//172/200
171 24/8/1/22/10.2//172/200
172 24/9/1/23/10.2//172/290
173 24/9/2/33/10.2//172/20
174 24/10/1/22/10.2//172/20

CONTENTS OF : E:\CB400B.TM

LINE # -----
175 24/10/2/10/10.2//172/110
176 24/11/1/17/10//172/20
177 24/12/1/10/10.2//172/200
178 24/13/1/10/10.2//172/200
179 24/13/2/24/10.2//172/290
180 24/14/1/26/10.2//172/110
181 24/15/1/43/14.3//172/290
182 24/15/2/33/14.3//172/20
183 25/1/1/4.5/2.5/5/.81/.64
184 25/1/2/4.5/2.5/2/.81/.64
185 25/1/3/4.5/2.5/4/.81/.64
186 25/2/1/4.5/2.5/1/.81/.64
187 25/2/2/4.5/2.5/1/.81/.64
188 25/3/1/4.5/2.5/2/.81/.64
189 25/3/2/4.5/2.5/1/.81/.64
190 25/4/1/4.5/2.5/1/.81/.64
191 25/5/1/6.5/2.5/1/.81/.64
192 25/5/2/55/1/1/.81/.64
193 25/6/1/6.5/2.5/2/.81/.64
194 25/6/2/6.5/2.5/1/.81/.64
195 25/7/1/5.5/2.5/1/.81/.64
196 25/7/2/5.5/2.5/1/.81/.64
197 25/8/1/5.5/2.5/2/.81/.64
198 25/9/1/5.5/2.5/2/.81/.64
199 25/9/2/5.5/2.5/3/.81/.64
200 25/10/1/5.5/2.5/2/.81/.64
201 25/10/2/5.5/2.5/1/.81/.64
202 25/11/1/4.5/2.5/2/.81/.64
203 25/12/1/5.5/2.5/1/.81/.64
204 25/13/1/5.5/2.5/1/.81/.64
205 25/13/2/5.5/2.5/2/.81/.64
206 25/14/1/5.5/2.5/2/.81/.64
207 25/15/1/74/1/1/1.04/1
208 25/15/2/4.5/2.5/3/.81/.64
209 26/M/CBADP&L/CBADP&L/0FF//0FF/CBADCLG/0FF/0FF/0FF/0FF
210 27/M/340/SF-PERS/255/255/1.14/WATT-SF
211 29/1/////.38/CFM-SF/.38/CFM-SF
212 29/2/////.38/CFM-SF/.38/CFM-SF
213 29/3/////.38/CFM-SF/.38/CFM-SF
214 29/4/////.38/CFM-SF/.38/CFM-SF
215 29/5/////.38/CFM-SF/.38/CFM-SF
216 29/6/////.38/CFM-SF/.38/CFM-SF
217 29/7/////.38/CFM-SF/.38/CFM-SF
218 29/8/////.38/CFM-SF/.38/CFM-SF
219 29/9/////.38/CFM-SF/.38/CFM-SF
220 29/10/////.38/CFM-SF/.38/CFM-SF
221 29/11////////.38/CFM-SF
222 29/12////////.38/CFM-SF
223 29/13////////.38/CFM-SF
224 29/14////////.38/CFM-SF
225 29/15////////1.17/CFM-SF
226 31/4/1/32/10.3//147/SINE-FIT/80/50
227 SYSTEM - 2
228 39/2/REPLACE FLUORESCENT FIXTURES
229 40/1/PTAC
230 41/1/1/1
231 42/1/.2
232 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF

CONTENTS OF : E:\CB400B.TM

LINE # -----
233 40/2/RAD
234 41/2/1/2
235 42/2
236 45/2/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
237 40/3/UH
238 41/3/3/3
239 42/3//.1
240 45/3/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
241 EQUIPMENT - 2
242 59/2/CARLISLE///REPLACE FLUORESCENT FIXTURES
243 60/1/1/PKPLANT/1/1
244 62/1/EQ1161/14
245 65/1/1//2/3
246 67/1/EQ2102/1
247 69/1/EQ4003
248 69/3//EQ4381
249 LOAD - 3
250 19/3/COMBINED ECOS
251 20/1/1/GRND FL OFFICES/1156/1//0//11
252 20/2/1/GUARD OFFICER/231/1//0//10.8
253 20/3/1/CELL BLOCK/459/1//0//10.8
254 20/4/1/DAY ROOM/334/1//0//10.8
255 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
256 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
257 20/7/1/OFFICER/127/1//0//11.2
258 20/8/1/GUARDS DORM/506/1//0//11.2
259 20/9/1/FIREMANS DORM/780/1//0//11.2
260 20/10/1/2ND FL OFFICE/220/1//0//11.2
261 20/11/2/PROVOST MARSHALL/182/1//0//11
262 20/12/2/NCO/110/1//0//11.2
263 20/13/2/GUARDS DORM/251/1//0//11.2
264 20/14/2/TOILETS/300/1//0//11.2
265 20/15/3/TRUCK ROOM/1280/1//0//14.7
266 21/M///CBADCTX///CBADHTX
267 22/1/1/YES///118
268 22/7/1/YES///130
269 22/8/1/YES///130
270 22/9/1/YES///130
271 22/10/1/YES///130
272 22/11/1/YES///130
273 22/12/1/YES///130
274 22/13/1/YES///130
275 22/14/1/YES///130
276 24/1/1/31/10//179/20
277 24/1/2/29/10//179/110
278 24/1/3/48/10//179/200
279 24/2/1/8/10//179/110
280 24/2/2/22/10//179/200
281 24/3/1/27/10//179/20
282 24/3/2/8/10//179/110
283 24/4/1/6/10//179/20
284 24/5/1/7/14.3//179/110
285 24/5/2/44/14.3//179/200
286 24/6/1/22/14.3//179/20
287 24/6/2/7/14.3//179/110
288 24/7/1/11/10.2//179/110
289 24/7/2/11/10.2//179/200
290 24/8/1/22/10.2//179/200

CONTENTS OF : E:\CB400B.TM

LINE # -----

291 24/9/1/23/10.2//179/290
292 24/9/2/33/10.2//179/20
293 24/10/1/22/10.2//179/20
294 24/10/2/10/10.2//179/110
295 24/11/1/17/10//179/20
296 24/12/1/10/10.2//179/200
297 24/13/1/10/10.2//179/200
298 24/13/2/24/10.2//179/290
299 24/14/1/26/10.2//179/110
300 24/15/1/43/14.3//179/290
301 24/15/2/33/14.3//179/20
302 25/1/1/4.5/2.5/5/.81/.64
303 25/1/2/4.5/2.5/2/.81/.64
304 25/1/3/4.5/2.5/4/.81/.64
305 25/2/1/4.5/2.5/1/.81/.64
306 25/2/2/4.5/2.5/1/.81/.64
307 25/3/1/4.5/2.5/2/.81/.64
308 25/3/2/4.5/2.5/1/.81/.64
309 25/4/1/4.5/2.5/1/.81/.64
310 25/5/1/6.5/2.5/1/.81/.64
311 25/5/2/55/1/1/.81/.64
312 25/6/1/6.5/2.5/2/.81/.64
313 25/6/2/6.5/2.5/1/.81/.64
314 25/7/1/5.5/2.5/1/.81/.64
315 25/7/2/5.5/2.5/1/.81/.64
316 25/8/1/5.5/2.5/2/.81/.64
317 25/9/1/5.5/2.5/2/.81/.64
318 25/9/2/5.5/2.5/3/.81/.64
319 25/10/1/5.5/2.5/2/.81/.64
320 25/10/2/5.5/2.5/1/.81/.64
321 25/11/1/4.5/2.5/2/.81/.64
322 25/12/1/5.5/2.5/1/.81/.64
323 25/13/1/5.5/2.5/1/.81/.64
324 25/13/2/5.5/2.5/2/.81/.64
325 25/14/1/5.5/2.5/2/.81/.64
326 25/15/1/74/1/1/1.04/1
327 25/15/2/4.5/2.5/3/.81/.64
328 26/M/CBADP&L/CBADP&L/OFF//OFF//CBADCLG/OFF/OFF/OFF/OFF
329 27/M/340/SF-PERS/255/255/1.14/WATT-SF
330 29/1/////.25/CFM-SF/.25/CFM-SF
331 29/2/////.25/CFM-SF/.25/CFM-SF
332 29/3/////.25/CFM-SF/.25/CFM-SF
333 29/4/////.25/CFM-SF/.25/CFM-SF
334 29/5/////.25/CFM-SF/.25/CFM-SF
335 29/6/////.25/CFM-SF/.25/CFM-SF
336 29/7/////.25/CFM-SF/.25/CFM-SF
337 29/8/////.25/CFM-SF/.25/CFM-SF
338 29/9/////.25/CFM-SF/.25/CFM-SF
339 29/10/////.25/CFM-SF/.25/CFM-SF
340 29/11////////.25/CFM-SF
341 29/12////////.25/CFM-SF
342 29/13////////.25/CFM-SF
343 29/14////////.25/CFM-SF
344 29/15////////.61/CFM-SF
345 31/4/1/32/10.3//147/SINE-FIT/80/50
346 SYSTEM - 3
347 39/3/COMBINED ECOS
348 40/1/PTAC

CONTENTS OF : E:\CB400B.TM

LINE # -----
349 41/1/1/1
350 42/1/.2
351 45/1/CBADCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
352 40/2/RAD
353 41/2/1/2
354 42/2
355 45/2/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
356 40/3/UH
357 41/3/3/3
358 42/3//.1
359 45/3/0FF/0FF/0FF/0FF/CBADHTG/0FF/0FF/0FF/0FF
360 EQUIPMENT - 3
361 59/3/CARLISLE///COMBINED ECOS
362 60/1/1/PKPLANT/1/1
363 62/1/EQ1161/14
364 65/1/1//2/3
365 67/1/EQ2102/1
366 69/1/EQ4003
367 69/3//EQ4381

Building 400

Trace Output File

933702

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:18:43 1/27/94
Dataset Name: CB400 .TM

AIRFLOW - ALTERNATIVE 1

BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	5,289	5,289	6,915	1,627	0	0
2 RAD		0	0	0	0	1,962	0	0
3 UH		0	0	1,944	0	1,272	0	0
Totals		0	5,289	7,232	6,915	4,861	0	0

CAPACITY - ALTERNATIVE 1

BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		13.4	0.0	0.0	13.4	-263,424	0	0	0	0	0	-263,424
2 RAD		0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	-320,361
3 UH		0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	-120,567
Totals		13.4	0.0	0.0	13.4	-704,352	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 13.2 tons

ENGINEERING CHECKS - ALTERNATIVE 1

BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft/Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	1.13	395.7	350.6	34.22	1.13	-56.22	4,686	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529	
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==> Mo/Hr: 7/16						*	Mo/Hr: 7/16			Mo/Hr: 13/ 1	
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0						*	OADB: 91			OADB: 4	
Sens. + Lat. (Btu/h)	Space (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent (%)	*	Space Sensible (Btu/h)	Percent (%)	Space Peak (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	20,448	0		20,448	12.75	*	20,448	16.99	*	-26,370	-26,370
Glass Solar	15,990	0		15,990	9.97	*	15,971	13.27	*	0	0.00
Glass Cond	5,083	0		5,083	3.17	*	5,178	4.30	*	-25,537	-25,537
Wall Cond	25,132	0		25,132	15.67	*	26,404	21.94	*	-97,381	-97,381
Partition	237			237	0.15	*	237	0.20	*	-853	-853
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	64,931			64,931	40.49	*	27,521	22.87	*	-113,282	-113,282
Sub Total ==>	131,821	0		131,821	82.20	*	95,760	79.58	*	-263,424	-263,424
Internal Loads						*			*		
Lights	21,448	0		21,448	13.37	*	21,688	18.02	*	0	0.00
People	6,354			6,354	3.96	*	2,891	2.40	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total ==>	27,803	0	0	27,803	17.34	*	24,579	20.42	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				752	0.47	*		0.00	*	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*	0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*	0	0.00
						*			*		
Grand Total ==>	159,624	0	0	160,376	100.00	*	120,339	100.00	*	-263,424	-263,424

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains
Main Clg	13.4	160.4	119.4	5,289	75.1	62.6	67.0	54.0	52.1	56.2	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Totals	13.4	160.4									
Floor											
Part											
ExFlr											
Roof											
Wall											
Gross Total											
Glass (sf)											
(%)											

HEATING COIL SELECTION						AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)---	
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-263.4	5,289	68.0	113.8	Infil	1,627	1,627	0	Clg Cfm/Sqft	1.13	SADB	54.1 113.8
Aux Htg	0.0	0	0.0	0.0	Supply	5,289	5,289	0	Clg Cfm/Ton	395.71	Plenum	75.0 68.0
Preheat	-0.0	5,289	68.0	54.0	Mincfm	0	0	0	Clg Sqft/Ton	350.63	Return	75.0 68.0
Reheat	0.0	0	0.0	0.0	Return	5,289	5,289	0	Clg Btuh/Sqft	34.22	Ret/OA	75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	No. People	14	Runarnd	75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-263.4				Auxil	0	0	0	Htg Cfm/SqFt	1.13	Fn BldTD	0.0 0.0
									Htg Btuh/SqFt	-56.22	Fn Frict	0.1 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****													
Peaked at Time ==>			Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1		
Outside Air ==>			OADB/WB/HR: 0/ 0/ 0.0			*	OADB: 0			*	OADB: 4		
						*				*			
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)	
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72	
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73	
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62	
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27	
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00	
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66	
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00	
Internal Loads						*			*				
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
People	0			0	0.00	*	0	0.00	*	0	0	0.00	
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sup. Fan Heat				0	0.00	*			0.00	*		0.00	
Ret. Fan Heat		0		0	0.00	*			0.00	*		0.00	
Duct Heat Pkup		0		0	0.00	*			0.00	*		0.00	
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00	
Exhaust Heat		0	0	0	0.00	*			0.00	*		0.00	
Terminal Bypass		0	0	0	0.00	*			0.00	*		0.00	
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00	

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Grains	Leaving DB/WB/HR Deg F	Deg F	Grains	Gross Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	330	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Exflr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	3,632	0
Totals	0.0	0.0							Wall	5,164	581 11

HEATING COIL SELECTION				AIRFLOWS (cfm)				--ENGINEERING CHECKS--		--TEMPERATURES (F)--	
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	Type Clg	Htg Htg		
Main Htg	-320.4	0	0.0	0.0	Infil	0	1,962	Clg Cfm/Sqft	0.00	SADB	0.0 68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0 68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0 68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0 0.0
Total	-320.4				Auxil	0	0	Htg Btuh/SqFt	-57.94	Fn Frict	0.0 0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****										
Peaked at Time =>		Mo/Hr: 0 / 0		* Mo/Hr: 0 / 0		* Mo/Hr: 13 / 1				
Outside Air =>		DADB/WB/HR: 0 / 0 / 0.0		* DADB: 0		* DADB: 4				
	Space Sens.+Lat. Envelope Loads	Ret. Air (Btu/h)	Ret. Air Sensible (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Space Sens (Btu/h)	
						*			Coil Peak Tot Sens (Btu/h)	
						*			Percent (%)	
Skylite Solr	0	0		0	0.00	*	0	0.00	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	-6,946	-6,946
Wall Cond	0	0		0	0.00	*	0	0.00	-25,062	-25,062
Partition	0			0	0.00	*	0	0.00	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	0	0.00
Infiltration	0			0	0.00	*	0	0.00	-88,558	-88,558
Sub Total=>	0	0		0	0.00	*	0	0.00	-120,567	-120,567
Internal Loads						*				
Lights	0	0		0	0.00	*	0	0.00	0	0.00
People	0			0	0.00	*	0	0.00	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0.00
Sub Total=>	0	0	0	0	0.00	*	0	0.00	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0
Exhaust Heat		0	0	0	0.00	*		0.00	*	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*	0.00
Grand Total=>	0	0	0	0	0.00	*	0	0.00	-120,567	-120,567
										100.00

COOLING COIL SELECTION								AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)			
Main Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0			
Aux Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0			
Opt Vent	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	0	0	0
Totals	0.0	0.0				Wall	1,087	108	10	

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-120.6	1,944	68.0	125.0	Vent	0	0	0.00	Elg Cfm/Sqft	0.00	SADB	0.0
				Infil	0	1,272	Clg Cfm/Ton	0.00	Plenum	0.0	68.0	
Aux Htg	0.0	0	0.0	0.0	Supply	0	1,944	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	1,944	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	1.52	Fn BldTD	0.0	0.0
Total	-120.6				Auxil	0	0	Htg Btuh/SqFt	-94.19	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 1

BASE BUILDING

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values ----- (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Caoac. (Btu/sqft/F)		
		Summr ExFlr		Wintr Skylt		Summr Roof		Wintr Windo					
		Part.	Skylt	Roof	Windo	Wall	Ceil.						
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17	
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53	
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23	
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86	
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73	
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27	
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75	
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09	
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70	
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16	
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60	
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60	
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17	
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53	
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23	
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86	
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73	
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27	
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75	
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09	
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70	
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16	
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60	
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67	
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42	
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81	
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13	
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06	
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97	
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50	
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50	
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50	
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65	

BUILDING AREAS - ALTERNATIVE 1

BASE BUILDING

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor Flr	Number of Duplicate Rm	Floor	Total	Exposed	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
				Area/Dupl Room (sqft)	Floor Area (sqft)	Partition Area (sqft)			
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	1,156
2	GUARD OFFICER	1	1	231	231	0	0	0	0
3	CELL BLOCK	1	1	459	459	0	0	0	0
4	DAY ROOM	1	1	334	334	330	0	0	0
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0
7	OFFICER	1	1	127	127	0	0	0	127
8	GUARDS DORM	1	1	506	506	0	0	0	506
9	FIREMANS DORM	1	1	780	780	0	0	0	780
10	2ND FL OFFICE	1	1	220	220	0	0	0	220
Zone	1 Total/Ave.				4,686	330	0	0	2,789
System	1 Total/Ave.				4,686	330	0	0	2,789
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	1,156
2	GUARD OFFICER	1	1	231	231	0	0	0	0
3	CELL BLOCK	1	1	459	459	0	0	0	0
4	DAY ROOM	1	1	334	334	330	0	0	0
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0
7	OFFICER	1	1	127	127	0	0	0	127
8	GUARDS DORM	1	1	506	506	0	0	0	506
9	FIREMANS DORM	1	1	780	780	0	0	0	780
10	2ND FL OFFICE	1	1	220	220	0	0	0	220
Zone	1 Total/Ave.				4,686	330	0	0	2,789
11	PROVOST MARSHALL	1	1	182	182	0	0	0	182
12	NCO	1	1	110	110	0	0	0	110
13	GUARDS DORM	1	1	251	251	0	0	0	251
14	TOILETS	1	1	300	300	0	0	0	300
Zone	2 Total/Ave.				843	0	0	0	843
System	2 Total/Ave.				5,529	330	0	0	3,632
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0
Zone	3 Total/Ave.				1,280	0	0	0	0
System	3 Total/Ave.				1,280	0	0	0	0
Building					11,495	659	0	0	6,421
							0	0	1,165
							0	0	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
BASE BUILDING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.7	4	24	-35,218	13	262	361.6	0	0	0.0	0	0
5 - 10	1.3	10	67	-70,435	18	352	723.2	0	0	0.0	0	0
10 - 15	2.0	10	68	-105,653	26	507	1,084.8	0	0	0.0	0	0
15 - 20	2.7	6	37	-140,870	4	83	1,446.5	0	0	0.0	0	0
20 - 25	3.3	0	0	-176,088	1	25	1,808.1	0	0	0.0	0	0
25 - 30	4.0	7	45	-211,306	2	37	2,169.7	0	0	0.0	0	0
30 - 35	4.7	3	22	-246,523	0	4	2,531.3	0	0	0.0	0	0
35 - 40	5.3	6	38	-281,741	3	52	2,892.9	0	0	0.0	0	0
40 - 45	6.0	7	49	-316,958	0	8	3,254.5	0	0	0.0	0	0
45 - 50	6.7	7	49	-352,176	32	633	3,616.2	0	0	0.0	0	0
50 - 55	7.4	0	0	-387,393	0	0	3,977.8	0	0	0.0	0	0
55 - 60	8.0	2	15	-422,611	0	0	4,339.4	0	0	0.0	0	0
60 - 65	8.7	8	50	-457,829	0	0	4,701.0	0	0	0.0	0	0
65 - 70	9.4	1	5	-493,046	0	0	5,062.6	0	0	0.0	0	0
70 - 75	10.0	0	0	-528,264	0	0	5,424.2	100	1,070	0.0	0	0
75 - 80	10.7	0	0	-563,482	0	0	5,785.9	0	0	0.0	0	0
80 - 85	11.4	0	0	-598,699	0	0	6,147.5	0	0	0.0	0	0
85 - 90	12.0	2	15	-633,917	0	0	6,509.1	0	0	0.0	0	0
90 - 95	12.7	6	37	-669,134	0	0	6,870.7	0	0	0.0	0	0
95 - 100	13.4	22	145	-704,352	0	0	7,232.3	0	0	0.0	0	0
Hours Off	0.0	0	8,094	0	0	6,797	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	3	Zone Number
-----------------------	---	---	---	---	-------------

Max. Temp.	83.1	93.0	94.7	93.8	
Mo./Hr.	7	1	8	24	8 23
Day Type		5	1	1	1

	Number of Hours			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	1,119	1,296	1,240
85 - 90	0	983	1,336	1,194
80 - 85	483	821	296	318
75 - 80	2,320	545	744	248
70 - 75	807	615	306	456
65 - 70	566	2,087	2,095	216
60 - 65	336	1,453	1,448	416
55 - 60	1,224	480	518	604
50 - 55	630	652	721	843
Below 50	2,394	0	0	3,225

Min. Temp.	36.3	55.0	55.0	30.1	
Mo./Hr.	2	8	1	17	1 13
Day Type		5	3	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,980	21	766	3
Feb	3,601	21	724	3
March	4,358	21	465	3
April	3,788	21	144	3
May	4,265	21	0	0
June	5,752	41	0	0
July	6,852	42	0	0
Aug	6,059	41	0	0
Sept	3,890	40	0	0
Oct	4,165	21	61	3
Nov	3,789	21	303	3
Dec	3,790	21	617	3
Total	54,290	42	3,081	3

Building Energy Consumption = 42,918 (Btu/Sq Ft/Year)
Source Energy Consumption = 84,095 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1

BASE BUILDING

P HOTH20 766 724 465 144 0 0 0 0 0 61 303 617 3,081
 PK 3.2 3.2 3.2 3.2 0.0 0.0 0.0 0.0 0.0 3.2 3.2 3.2 3.2

1 EQ5020 HEAT WATER CIRC. PUMP C.V.
 ELEC 4 4 3 2 0 0 0 0 0 2 - 4 19
 PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 41.5 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	20.4	49.06
Sub Total			20.4	49.06
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.5	1.09
Sub Total			0.5	1.09
Sub Total			0.0	0.00

Miscellaneous

Lights	20.7	49.85
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	20.7	49.85
Grand Total	41.5	100.00

** **
** TRACE 600 ANALYSIS **
** **
** by **
** **

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:36:38 1/27/94
Dataset Name: CB400 .TM

AIRFLOW - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	3,730	3,730	4,971	1,241	0	0
2 RAD		0	0	0	0	1,498	0	0
3 UH		0	0	1,563	0	1,239	0	0
Totals		0	3,730	5,293	4,971	3,978	0	0

CAPACITY - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		9.7	0.0	0.0	9.7	-145,505	0	0	0	0	0	0	-145,505
2 RAD		0.0	0.0	0.0	0.0	-179,921	0	0	0	0	0	0	-179,921
3 UH		0.0	0.0	0.0	0.0	-96,955	0	0	0	0	0	0	-96,955
Totals		9.7	0.0	0.0	9.7	-422,381	0	0	0	0	0	0	-422,381

The building peaked at hour 16 month 7 with a capacity of 9.5 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	PTAC		0.00	0.80	384.5	483.1	24.84	0.80	-31.05	4,686	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-32.54	5,529	
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.22	-75.75	1,280	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4
 * * *

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	12,802	0		12,802	11.00	*	13,334	15.81	*	-18,204	-18,204 12.51
Glass Solar	15,990	0		15,990	13.74	*	16,028	19.00	*	0	0.00
Glass Cond	5,023	0		5,023	4.31	*	5,188	6.15	*	-25,537	-25,537 17.55
Wall Cond	3,790	0		3,790	3.26	*	3,869	4.59	*	-14,458	-14,458 9.94
Partition	237			237	0.20	*	237	0.28	*	-853	-853 0.59
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	50,410			50,410	43.30	*	21,221	25.16	*	-86,452	-86,452 59.42
Sub Total==>	88,252	0		88,252	75.81	*	59,877	71.00	*	-145,505	-145,505 100.00
Internal Loads						*			*		
Lights	21,306	0		21,306	18.30	*	21,585	25.59	*	0	0.00
People	6,320			6,320	5.43	*	2,873	3.41	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	27,626	0	0	27,626	23.73	*	24,459	29.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				530	0.46	*		0.00	*		0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0.00
						*			*		
Grand Total==>	115,878	0	0	116,408	100.00	*	84,335	100.00	*	-145,505	-145,505 100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)				
Main Clg	9.7	116.4	83.4	3,730	75.1	62.9	68.5	54.1	52.1	56.2	4,686
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part 330
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Totals	9.7	116.4									Roof 2,789 0 0
											Wall 4,280 476 11

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--	
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg
Main Htg	-145.5	3,730	68.0	103.9	Infil	1,241	1,241	0	Clg Cfm/Sqft	0.80	SADB 54.2 103.9
Aux Htg	0.0	0	0.0	0.0	Supply	3,730	3,730	0	Clg Cfm/Ton	384.47	Plenum 75.0 68.0
Preheat	-0.0	3,730	68.0	54.1	Mincfm	0	0	0	Clg Sqft/Ton	483.06	Return 75.0 68.0
Reheat	0.0	0	0.0	0.0	Return	3,730	3,730	0	Clg Btuh/Sqft	24.84	Ret/DA 75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	No. People	14	Runarnd 75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0	Htg % DA	0.0	Fn MtrTD 0.0 0.0
Total	-145.5				Auxil	0	0	0	Htg Cfm/Sqft	0.80	Fn BldTD 0.0 0.0
									Htg Btuh/SqFt	-31.05	Fn Frict 0.1 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ::=> Mo/Hr: 0 / 0 * Mo/Hr: 0 / 0 * Mo/Hr: 13 / 1

Outside Air => OAD3/WB/HR: 0/ 0/ 0.0

*

Mo /

Hr:

Mo/Hr: 13 / 1

OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-26,174	-26,174	14.55
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	17.32
Wall Cond	0	0		0	0.00	*	0	0.00	*	-17,419	-17,419	9.68
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.47
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-104,307	-104,307	57.97
Sub Total=>	0	0		0	0.00	*	0	0.00	*	-179,921	-179,921	100.00
Internal Loads					*		*	*				
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total=>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total=>	0	0	0	0	0.00	*	0	0.00	*	-179,921	-179,921	100.00

--COOLING GOUT SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Floor	5,529	.
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	330	.
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	.
Totals	0.0	0.0								Roof	3,632	0 0
										Wall	5.164	581 11

-----AREAS

-----HEATING COIL SELECTION

	Capacity (Mbh)	Coil (cfm)	Airfl Ent Deg F	Lvg Deg F	Type Vent	Cooling 0	Heating 0	Clg % OA Clg Cfm/Sqft	0.0	Type SADB	Clg 0.0	Htg 68.1
Main Htg	-179.9	0	0.0	0.0	Infil	0	1,498	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-179.9				Auxil	0	0	Htg Btuh/SqFt	-32.54	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-- ENGINEERING CH

-- --TEMPERATURES (F)--

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>			Mo/Hr: 0/ 0			Mo/Hr: 0/ 0			Mo/Hr: 13/ 1		
Outside Air ==>			OADB/WB/HR: 0/ 0/ 0.0			OADB: 0			OADB: 4		
								*			
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	7.16
Wall Cond	0	0		0	0.00	*	0	0.00	*	-3,721	3.84
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-86,288	89.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-96,955	100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-96,955	100.00

COOLING COIL SELECTION								AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Floor	1,280	Glass (sf)	(%)		
Main Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0				
Aux Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0				
Opt Vent	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	0	0	0	0
Totals	0.0	0.0			Wall	1,087	108	10		

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-97.0	1,563	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	1,239	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Min cfm	0	1,563	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	1,563	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-97.0				Auxil	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0
							0	Htg Btuh/SqFt	-75.75	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Windo		Wintr Windo					
			ExFlr	Skylt	Roof	Wind	Wall	Ceil.						
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04		
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04		
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	157.6	35.06		
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	156.5	34.81		
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	214.0	47.40		
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	155.1	34.51		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	173.4	38.51		
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.113	0.810	0.837	0.059	0.000	163.6	36.42		
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87		
Building		0.144	0.000	0.000	0.000	0.108	0.825	0.853	0.059	0.000	158.0	35.09		

BUILDING AREAS - ALTERNATIVE 2

WALL & ROOF INSULATION

----- BUILDING AREAS -----

Room Number	Description	Floor Area/Dupl		Total Floor Area	Partition Area	Exposed Floor Area	Skylight Area	Skl /Rf (%)	Net Roof Area	Window Area	Win /Wl (%)	Net Wall Area
		Duplicate Flr	Rm	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(%)	(sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	108	10	979
Building					11,495	659	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.108 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.144 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.130 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.74 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 11.07 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load ----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.5	0	0	-21,119	25	388	264.6	0	0	0.0	0	0
5 - 10	1.0	4	27	-42,238	15	233	529.3	0	0	0.0	0	0
10 - 15	1.5	4	22	-63,357	11	170	793.9	0	0	0.0	0	0
15 - 20	1.9	8	49	-84,476	2	25	1,058.5	0	0	0.0	0	0
20 - 25	2.4	10	62	-105,595	0	0	1,323.2	0	0	0.0	0	0
25 - 30	2.9	0	0	-126,714	0	0	1,587.8	0	0	0.0	0	0
30 - 35	3.4	6	38	-147,833	2	33	1,852.5	0	0	0.0	0	0
35 - 40	3.9	7	43	-168,952	2	24	2,117.1	0	0	0.0	0	0
40 - 45	4.4	9	56	-190,071	43	653	2,381.7	0	0	0.0	0	0
45 - 50	4.9	4	23	-211,190	0	0	2,646.4	0	0	0.0	0	0
50 - 55	5.3	11	67	-232,309	0	0	2,911.0	0	0	0.0	0	0
55 - 60	5.8	4	23	-253,428	0	0	3,175.6	0	0	0.0	0	0
60 - 65	6.3	0	0	-274,547	0	0	3,440.3	0	0	0.0	0	0
65 - 70	6.8	8	50	-295,667	0	0	3,704.9	0	0	0.0	0	0
70 - 75	7.3	5	34	-316,786	0	0	3,969.5	100	1,070	0.0	0	0
75 - 80	7.8	0	0	-337,905	0	0	4,234.2	0	0	0.0	0	0
80 - 85	8.2	0	0	-359,024	0	0	4,498.8	0	0	0.0	0	0
85 - 90	8.7	0	0	-380,143	0	0	4,763.5	0	0	0.0	0	0
90 - 95	9.2	3	19	-401,262	0	0	5,028.1	0	0	0.0	0	0
95 - 100	9.7	18	113	-422,381	0	0	5,292.7	0	0	0.0	0	0
Hours Off	0.0	0	8,134	0	0	7,234	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	3	Zone Number
-----------------------	---	---	---	---	-------------

Max. Temp.	81.3	96.0	98.2	100.8	
Mo./Hr.	7 22	8 18	8 23	8 19	
Day Type	4	2	1	2	

	Number of Hours			
Above 100	0	0	0	229
95 - 100	0	504	816	1,442
90 - 95	0	1,704	1,216	537
85 - 90	0	116	896	96
80 - 85	196	1,024	126	516
75 - 80	2,732	390	820	108
70 - 75	640	678	347	167
65 - 70	864	2,307	2,415	719
60 - 65	563	1,288	1,164	362
55 - 60	1,120	504	559	382
50 - 55	799	245	401	1,004
Below 50	1,846	0	0	3,198

Min. Temp.	39.4	55.0	55.0	30.3	
Mo./Hr.	2 8	1 11	1 4	2 10	
Day Type	5	4	4	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Thrm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,978	21	374	2
Feb	3,599	21	396	2
March	4,356	21	233	2
April	3,787	21	59	2
May	4,235	21	0	0
June	4,970	34	0	0
July	6,029	36	0	0
Aug	5,749	35	0	0
Sept	4,056	35	0	0
Oct	4,165	21	1	0
Nov	3,787	21	141	2
Dec	3,788	21	281	2
Total	52,501	36	1,487	2

Building Energy Consumption = 28,524 (Btu/Sq Ft/Year) Floor Area = 11,495 (Sq Ft)
Source Energy Consumption = 64,017 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2 WALL & ROOF INSULATION

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2

WALL & ROOF INSULATION

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 35.9 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment				
1	EQI161	AIR-CLD COND COMP <15 TONS	14.9	41.46
Sub Total			14.9	41.46
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	0.89
Sub Total			0.3	0.89
Sub Total			0.0	0.00
Miscellaneous				
Lights			20.7	57.65
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			20.7	57.65
Grand Total			35.9	100.00

** **
** TRACE 600 ANALYSIS **
** by **
** **

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:54:55 1/27/94
Dataset Name: CB400 .TM

AIRFLOW - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	5,253	5,253	6,708	1,455	0	0
2 RAD		0	0	0	0	1,756	0	0
3 UH		0	0	1,297	0	696	0	0
Totals		0	5,253	6,550	6,708	3,907	0	0

CAPACITY - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		12.8	0.0	0.0	12.8	-251,499	0	0	0	0	0	-251,499
2 RAD		0.0	0.0	0.0	0.0	-305,974	0	0	0	0	0	-305,974
3 UH		0.0	0.0	0.0	0.0	-80,451	0	0	0	0	0	-80,451
Totals		12.8	0.0	0.0	12.8	-637,924	0	0	0	0	0	-637,924

The building peaked at hour 16 month 7 with a capacity of 12.7 tons

ENGINEERING CHECKS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	Floor Area	Sq Ft
1 Main		PTAC	0.00	1.12	409.9	.365.7	32.82	1.12	-53.67	4,686	
2 Main		RAD	0.00	0.00	0.0	0.0	0.00	0.00	-55.34	5,529	
3 Main		UH	0.00	0.00	0.0	0.0	0.00	1.01	-62.85	1,280	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4
 * * *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	20,448	0		20,448	13.30	*	20,448	17.41	*	-26,370	-26,370 10.49
Glass Solar	15,990	0		15,990	10.40	*	15,971	13.60	*	0	0.00
Glass Cond	5,083	0		5,083	3.31	*	5,178	4.41	*	-25,537	-25,537 10.15
Wall Cond	25,132	0		25,132	16.34	*	26,404	22.48	*	-97,381	-97,381 38.72
Partition	237			237	0.15	*	237	0.20	*	-853	-853 0.34
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	58,332			58,332	37.93	*	24,624	20.97	*	-101,358	-101,358 40.30
Sub Total==>	125,222	0		125,222	81.43	*	92,863	79.07	*	-251,499	-251,499 100.00
Internal Loads						*			*		
Lights	21,448	0		21,448	13.95	*	21,688	18.47	*	0	0.00
People	6,354			6,354	4.13	*	2,891	2.46	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	27,803	0	0	27,803	18.08	*	24,579	20.93	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				747	0.49	*		0.00	*	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*	0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*	0	0.00
Grand Total==>	153,024	0	0	153,772	100.00	*	117,442	100.00	*	-251,499	-251,499 100.00

COOLING COIL SELECTION								AREAS					
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Floor	Gross Total Glass (sf)	(%)
Main Clg	12.8	153.8	116.5	5,253	75.1	62.5	66.7	54.4	52.4	56.9	Part	330	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	2,789	0
Totals	12.8	153.8									Wall	4,280	476 11

HEATING COIL SELECTION				AIRFLOWS (cfm)				ENGINEERING CHECKS--		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-251.5	5,253	68.0	112.0	Infil	1,455	1,455	0	Clg Cfm/Sqft	1.12	SADB	54.5
Aux Htg	0.0	0	0.0	0.0	Supply	5,253	5,253	0	Clg Cfm/Ton	409.92	Plenum	75.0
Preheat	-0.0	5,253	68.0	54.3	Mincfm	0	0	0	Clg Sqft/Ton	365.69	Return	68.0
Reheat	0.0	0	0.0	0.0	Return	5,253	5,253	0	Clg Btuh/Sqft	32.82	Ret/OA	75.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	No. People	14	Runarnd	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0	Htg % OA	0.0	Fn MtrTD	0.0
Total	-251.5				Auxil	0	0	0	Htg Cfm/SqFt	1.12	Fn BldTD	0.0
						0	0	0	Htg Btuh/SqFt	-53.67	Fn Frict	0.1

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****													
Peaked at Time ==>			Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1		
Outside Air ==>			OADB/WB/HR: 0/ 0/ 0.0			*	OADB: 0			*	OADB: 4		
						*				*			
Envelope Loads	Space Sens.+Lat.	Ret. Air Sensible	Ret. Air Latent	Net Total	Percent Of Tot	*	Space Sensible	Percent Of Tot	*	Space Peak Sens	Coil Peak Tot Sens	Percent Of Tot	
Skylite Solr	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)	*	(Btuh)	(%)	*	(Btuh)	(Btuh)	(%)	
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Roof Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Glass Solar	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Glass Cond	0	0	0	0	0.00	*	0	0.00	*	-31,168	-31,168	10.19	
Wall Cond	0	0	0	0	0.00	*	0	0.00	*	-117,322	-117,322	38.34	
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.28	
Exposed Flocr	0			0	0.00	*	0	0.00	*	0	0	0.00	
Infiltration	0			0	0.00	*	0	0.00	*	-122,290	-122,290	39.97	
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	-305,974	-305,974	100.00	
Internal Loads						*			*				
Lights	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
People	0			0	0.00	*	0	0.00	*	0	0	0.00	
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sup. Fan Heat				0	0.00	*			0.00	*		0.00	
Ret. Fan Heat			0	0	0.00	*			0.00	*		0.00	
Duct Heat Pkup			0	0	0.00	*			0.00	*		0.00	
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00	
Exhaust Heat			0	0	0.00	*			0.00	*		0.00	
Terminal Bypass			0	0	0.00	*			0.00	*		0.00	
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-305,974	-305,974	100.00	

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering Deg F	DB/WB/HR Grains	Leaving Deg F	DB/WB/HR Grains	Gross Total	Floor	Glass (sf)	(%)	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	330		
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	Roof	3,632	0	0
Totals	0.0	0.0						Wall	5,164	581	11

HEATING COIL SELECTION				AIRFLOWS (cfm)				--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-306.0	0	0.0	0.0	Infil	0	1,756	0	Clg Cfm/Sqft	0.00	SADB	0.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	0	Clg Cfm/Ton	0.00	Plenum	0.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	0	Clg Sqft/Ton	0.00	Return	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Ret/OA	0.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn MtrTD	0.0	
Total	-306.0			Auxil	0	0	Htg Btuh/SqFt	-55.34	Fn BldTD	0.0	Fn Frict	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>			Mo/Hr: 0/ 0			* Mo/Hr: 0/ 0			* Mo/Hr: 13/ 1		
Outside Air ==>			OADB/WB/HR: 0/ 0/ 0.0			* OADB: 0			* OADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-48,442	-48,442
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-80,451	-80,451
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-80,451	-80,451
						*			*		
						*			*		

COOLING COIL SELECTION								AREAS				
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0
Totals	0.0	0.0									Wall	1,087 108 10

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-80.5	1,297	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	696	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	1,297	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	1,297	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-80.5				Auxil	0	0	Htg Cfm/SqFt	1.01	Fn BldTD	0.0	0.0
							0	Htg Btuh/SqFt	-62.85	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Windo		Wintr Windo					
			ExFlr	Skylt	Roof	Windo	Wall	Ceil.						
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67		
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42		
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81		
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06		
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97		
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65		

BUILDING AREAS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

B U I L D I N G A R E A S

Room Number	Description	Number of Duplicate Flr Rm		Floor Area/Dupl (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed			Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Duplicate Flr	Rm	Area/Room (sqft)	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.6	1	8	-31,896	13	253	327.5	0	0	0.0	0	0
5 - 10	1.3	7	45	-63,792	16	302	655.0	0	0	0.0	0	0
10 - 15	1.9	18	122	-95,689	24	468	982.5	0	0	0.0	0	0
15 - 20	2.6	0	0	-127,585	8	155	1,310.0	0	0	0.0	0	0
20 - 25	3.2	0	0	-159,481	3	58	1,637.5	0	0	0.0	0	0
25 - 30	3.8	7	45	-191,377	0	0	1,964.9	0	0	0.0	0	0
30 - 35	4.5	6	41	-223,273	1	20	2,292.4	0	0	0.0	0	0
35 - 40	5.1	6	41	-255,170	2	36	2,619.9	0	0	0.0	0	0
40 - 45	5.8	9	60	-287,066	0	4	2,947.4	0	0	0.0	0	0
45 - 50	6.4	7	45	-318,962	33	641	3,274.9	0	0	0.0	0	0
50 - 55	7.0	0	0	-350,858	0	0	3,602.4	0	0	0.0	0	0
55 - 60	7.7	2	15	-382,754	0	0	3,929.9	0	0	0.0	0	0
60 - 65	8.3	5	35	-414,651	0	0	4,257.4	0	0	0.0	0	0
65 - 70	9.0	2	15	-446,547	0	0	4,584.9	0	0	0.0	0	0
70 - 75	9.6	1	8	-478,443	0	0	4,912.4	0	0	0.0	0	0
75 - 80	10.3	0	0	-510,339	0	0	5,239.9	0	0	0.0	0	0
80 - 85	10.9	0	0	-542,235	0	0	5,567.3	100	1,070	0.0	0	0
85 - 90	11.5	0	0	-574,132	0	0	5,894.8	0	0	0.0	0	0
90 - 95	12.2	0	0	-606,028	0	0	6,222.3	0	0	0.0	0	0
95 - 100	12.8	30	202	-637,924	0	0	6,549.8	0	0	0.0	0	0
Hours Off	0.0	0	8,078	0	0	6,823	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number		
Range (F)	1	1	2

Max. Temp.	83.2	93.0	94.7	93.8
Mo./Hr.	7	1	8	24
Day Type	5	1	1	1

Above 100	0	0	0	0	Number of Hours
95 - 100	0	0	0	0	
90 - 95	0	1,119	1,296	1,240	
85 - 90	0	988	1,336	1,302	
80 - 85	525	821	296	210	
75 - 80	2,314	579	744	272	
70 - 75	823	589	374	486	
65 - 70	529	2,151	2,073	349	
60 - 65	369	1,413	1,450	297	
55 - 60	1,207	473	495	950	
50 - 55	641	627	696	525	
Below 50	2,352	0	0	3,129	

Min. Temp.	36.7	55.0	55.0	31.6
Mo./Hr.	2	8	1	18
Day Type	5	3	3	5

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,980	21	726	3
Feb	3,600	21	684	3
March	4,357	21	435	3
April	3,788	21	129	3
May	4,264	21	0	0
June	5,806	40	0	0
July	6,820	41	0	0
Aug	6,101	40	0	0
Sept	3,963	39	0	0
Oct	4,165	21	56	3
Nov	3,788	21	286	3
Dec	3,790	21	584	3
Total	54,422	41	2,900	3

Building Energy Consumption = 41,389 (Btu/Sq Ft/Year)
Source Energy Consumption = 82,121 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

P HOTH20	726	684	435	129	0	0	0	0	0	56	286	584	2,900
PK	3.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	3.1	3.1	3.1	3.1
1 EQ5020													
ELEC	4	3	3	1	0	0	0	0	0	0	2	3	17
PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

HEAT WATER CIRC. PUMP C.V.

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 40.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	19.5	48.03
Sub Total			19.5	48.03
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.4	1.11
Sub Total			0.4	1.11
Sub Total			0.0	0.00

Miscellaneous

Lights	20.7	50.86
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	20.7	50.86
Grand Total	40.7	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program Was Run: 14:13:20 1/27/94
Dataset Name: CB400.TM

AIRFLOW - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	5,179	5,179	6,806	1,627	0	0
2 RAD		0	0	0	0	1,962	0	0
3 UH		0	0	1,944	0	1,272	0	0
Totals		0	5,179	7,123	6,806	4,861	0	0

CAPACITY - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		13.2	0.0	0.0	13.2	-263,424	0	0	0	0	0	0	-263,424
2 RAD		0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	0	-320,361
3 UH		0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	0	-120,567
Totals		13.2	0.0	0.0	13.2	-704,352	0	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 13.0 tons

ENGINEERING CHECKS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	Floor Area Sq Ft	
1 Main		PTAC	0.00	1.11	393.5	356.0	33.71	1.11	-56.22	4,686	
2 Main		RAD	0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529	
3 Main		UH	0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==> Mo/Hr: 7/16						*	Mo/Hr: 7/16			*	Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0						*	OADB: 91	*	OADB: 4	*	*
Space Sens.+Lat. Loads (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Sens (Btu/h)	Peak Coil (Btu/h)	Percent Tot (%)
Envelope Loads					*			*			
Skylite Solr	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	20,448	0	20,448	12.25	*	20,448	17.36	*	-26,370	-26,370	10.01
Glass Solar	15,990	0	15,990	10.12	*	15,971	13.56	*	0	0	0.00
Glass Cond	5,083	0	5,083	3.22	*	5,178	4.40	*	-25,537	-25,537	9.69
Wall Cond	25,132	0	25,132	15.91	*	26,404	22.41	*	-97,381	-97,381	36.97
Partition	237		237	0.15	*	237	0.20	*	-853	-853	0.32
Exposed Floor	0		0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	65,031		65,031	41.17	*	27,521	23.36	*	-113,282	-113,282	43.00
Sub Total==>	131,921	0	131,921	83.52	*	95,760	81.28	*	-263,424	-263,424	100.00
Internal Loads					*			*			
Lights	18,946	0	18,946	11.99	*	19,157	16.26	*	0	0	0.00
People	6,354		6,354	4.02	*	2,891	2.45	*	0	0	0.00
Misc	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	25,300	0	25,300	16.02	*	22,049	18.72	*	0	0	0.00
Ceiling Load	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat			737	0.47	*		0.00	*			0.00
Ret. Fan Heat		0	0	0.00	*		0.00	*			0.00
Duct Heat Pkup		0	0	0.00	*		0.00	*			0.00
OV/UNDR Sizing	0		0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0.00	*		0.00	*			0.00
Terminal Bypass		0	0	0.00	*		0.00	*			0.00
Grand Total==>	157,222	0	157,958	100.00	*	117,809	100.00	*	-263,424	-263,424	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (Moh)	Entering DB (Deg F)	DB/WB/HR Deg F	Leaving DB (Deg F)	WB/HR Deg F	Grains	Gross Total Floor	Glass (sf)	(%)	
Main Clg	13.2	158.0	116.8	5.179	75.1	62.6	67.3	54.0	52.1	56.3	Part 330
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof 2,789 0 0
Totals	13.2	158.0							4,280	476	11

HEATING COIL SELECTION				AIRFLOWS (cfm)				ENGINEERING CHECKS--		TEMPERATURES (F)--	
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0.0	Type Clg	Htg Htg		
Main Htg	-263.4	5,179	68.0	114.7	Infil	1,627	1,627	Clg Cfm/Sqft 1.11	SADB 54.1	114.7	
Aux Htg	0.0	0	0.0	0.0	Supply	5,179	5,179	Clg Cfm/Ton 393.46	Plenum 75.0	68.0	
Preheat	-0.0	5,179	68.0	54.0	Min cfm	0	0	Clg Sqft/Ton 355.99	Return 75.0	68.0	
Reheat	0.0	0	0.0	0.0	Return	5,179	5,179	Clg Btuh/Sqft 33.71	Ret/OA 75.0	68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People 14	Runarnd 75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA 0.0	Fn MtrTD 0.0	0.0	
Total	-263.4				Auxil	0	0	Htg Cfm/SqFt 1.11	Fn BldTD 0.0	0.0	
							Htg Btuh/SqFt -56.22	Fn Frict 0.1			

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 0/ 0			Mo/Hr: 0/ 0			Mo/Hr: 13/ 1						
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0			OADB: 0			OADB: 4						
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*		0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*		0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*		0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*		0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00

-----COOLING COIL SELECTION-----								-----AREAS-----			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)				
Main Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	330					
Aux Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0					
Opt Vent	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	3,632	0	0			
Totals	0.0	0.0			Wall	5,164	581	11			

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating Infil	Clg % DA 0	0.0	Type	Clg	Htg
Main Htg	-320.4	0	0.0	0.0	0	1,962	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-320.4				Auxil	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
						0	Htg Btuh/SqFt	-57.94	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			*			
Ret. Fan Heat		0		0	0.00	*			*			
Duct Heat Pkup		0		0	0.00	*			*			
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			*			
Terminal Bypass		0	0	0	0.00	*			*			
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains			Gross Total	Glass (sf) (%)			
Main Clg	0.0	0.0	0.0 0 0.0	0	0.0	0.0	0.0	Part	0		
Aux Clg	0.0	0.0	0.0 0 0.0	0	0.0	0.0	0.0	ExFlr	0		
Opt Vent	0.0	0.0	0.0 0 0.0	0	0.0	0.0	0.0	Roof	0	0	0
Totals	0.0	0.0		0	0.00	0.0	0.0	Wall	1,087	108	10

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-120.6	1,944	68.0	125.0	Infil	0	1,272	0.00	Clg Cfm/Sqft	0.00	SADB	0.0 125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	1,944	0.00	Clg Cfm/Ton	0.00	Plenum	0.0 68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	0.00	Clg Sqft/Ton	0.00	Return	0.0 68.0
Reheat	0.0	0	0.0	0.0	Return	0	1,944	0.00	Clg Btuh/Sqft	0.00	Ret/OA	0.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0.0	No. People	0	Runarnd	0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0.0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-120.6				Auxil	0	0	0.0	Htg Cfm/SqFt	1.52	Fn BldTD	0.0 0.0
							Htg Btuh/SqFt	-94.19	Fn Frict	0.0		

BUILDING U-VALUES - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Roof		Wintr Windo					
			ExFlr				Wind		Wall	Ceil.				
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67		
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42		
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81		
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06		
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97		
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65		

BUILDING AREAS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- BUILDING AREAS -----

Room Number	Description	Number of Duplicate Flr Rm		Floor Area/Dupl (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Exposed Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Area/Room (sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(%)	(sqft)	(%)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (cfm)	Hours (%)		Cap. (cfm)	Hours (%)	
0 - 5	0.7	7	45	-35,218	13	261	356.1	0	0	0.0	0	0
5 - 10	1.3	10	67	-70,435	18	361	712.3	0	0	0.0	0	0
10 - 15	2.0	9	60	-105,653	25	502	1,068.4	0	0	0.0	0	0
15 - 20	2.6	0	0	-140,870	5	104	1,424.6	0	0	0.0	0	0
20 - 25	3.3	3	22	-176,088	0	4	1,780.7	0	0	0.0	0	0
25 - 30	3.9	4	23	-211,306	3	53	2,136.9	0	0	0.0	0	0
30 - 35	4.6	9	60	-246,523	0	9	2,493.0	0	0	0.0	0	0
35 - 40	5.3	1	4	-281,741	1	16	2,849.2	0	0	0.0	0	0
40 - 45	5.9	11	71	-316,958	2	40	3,205.3	0	0	0.0	0	0
45 - 50	6.6	4	23	-352,176	32	637	3,561.5	0	0	0.0	0	0
50 - 55	7.2	0	0	-387,393	0	0	3,917.6	0	0	0.0	0	0
55 - 60	7.9	5	30	-422,611	0	0	4,273.8	0	0	0.0	0	0
60 - 65	8.6	6	40	-457,829	0	0	4,629.9	0	0	0.0	0	0
65 - 70	9.2	0	0	-493,046	0	0	4,986.1	0	0	0.0	0	0
70 - 75	9.9	0	0	-528,264	0	0	5,342.2	100	1,070	0.0	0	0
75 - 80	10.5	0	0	-563,481	0	0	5,698.4	0	0	0.0	0	0
80 - 85	11.2	2	15	-598,699	0	0	6,054.5	0	0	0.0	0	0
85 - 90	11.8	0	0	-633,917	0	0	6,410.7	0	0	0.0	0	0
90 - 95	12.5	6	37	-669,134	0	0	6,766.8	0	0	0.0	0	0
95 - 100	13.2	23	145	-704,352	0	0	7,123.0	0	0	0.0	0	0
Hours Off	0.0	0	8,118	0	0	6,773	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	3	Zone Number
Max. Temp.	83.1	92.6	94.4	93.3	
Mo./Hr.	7	1	8	23	8
Day Type	5	1	1	1	
					Number of Hours
Above 100	0	0	0	0	
95 - 100	0	0	0	0	
90 - 95	0	1,044	1,248	1,232	
85 - 90	0	939	1,374	944	
80 - 85	483	945	306	566	
75 - 80	2,301	492	744	250	
70 - 75	791	664	221	428	
65 - 70	589	2,079	2,169	252	
60 - 65	348	1,461	1,459	412	
55 - 60	1,200	480	518	573	
50 - 55	637	656	721	875	
Below 50	2,411	0	0	3,228	
Min. Temp.	36.2	55.0	55.0	30.0	
Mo./Hr.	2	8	1	16	1
Day Type	5	3	3	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,516	18	772	3
Feb	3,181	18	730	3
March	3,850	18	473	3
April	3,347	18	153	3
May	3,777	19	0	0
June	5,186	38	0	0
July	6,337	39	0	0
Aug	5,465	38	0	0
Sept	3,435	37	0	0
Oct	3,680	18	63	3
Nov	3,347	18	311	3
Dec	3,349	18	623	3
Total	48,465	39	3,124	3

Building Energy Consumption = 41,571 (Btu/Sq Ft/Year)
Source Energy Consumption = 79,415 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4

REPLACE FLUORESCENT LAMPS

P HOTH20	772	730	473	153	0	0	0	0	0	63	311	623	3,124
PK	3.2	3.2	3.2	3.2	0.0	0.0	0.0	0.0	0.0	3.2	3.2	3.2	3.2

1 EQ5020 HEAT WATER CIRC. PUMP C.V.
 ELEC 4 4 3 2 0 0 0 0 0 2 4 20
 PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 38.8 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	20.0	51.71
Sub Total			20.0	51.71
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.4	1.14
Sub Total			0.4	1.14
Sub Total			0.0	0.00

Miscellaneous

Lights	18.3	47.14
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	18.3	47.14
Grand Total	38.8	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:10:56 1/27/94
Dataset Name: CB4008 .TM

AIRFLOW - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	5,090	5,090	6,716	1,627	0	0
2 RAD		0	0	0	0	1,962	0	0
3 UH		0	0	1,944	0	1,272	0	0
Totals		0	5,090	7,034	6,716	4,861	0	0

CAPACITY - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating								
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent. Capacity (Btuh)	Heating Totals (Btuh)
1 PTAC		12.9	0.0	0.0	12.9	-263,424	0	0	0	0	0	0	0	-263,424
2 RAD		0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	0	0	-320,361
3 UH		0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	0	0	-120,567
Totals		12.9	0.0	0.0	12.9	-704,352	0	0	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 12.7 tons

ENGINEERING CHECKS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	PTAC		0.00	1.09	394.8	363.5	33.01	1.09	-56.22	4,686		
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529		
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280		

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4
 * * *

	Space Sens.+Lat. (BtuH)	Ret. Air Sensible (BtuH)	Ret. Air Latent (BtuH)	Net Total (BtuH)	Percent Of Tot (%)	*	Space Sensible (BtuH)	Percent Of Tot (%)	Space Peak Space Sens (BtuH)	Coil Peak Tot Sens (BtuH)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	20,448	0		20,448	13.22	*	20,448	17.79	*	-26,370	-26,370 10.01
Glass Solar	15,990	0		15,990	10.34	*	15,971	13.90	*	0	0.00
Glass Cond	5,083	0		5,083	3.29	*	5,178	4.51	*	-25,537	-25,537 9.69
Wall Cond	25,132	0		25,132	16.25	*	26,404	22.98	*	-97,381	-97,381 36.97
Partition	237			237	0.15	*	237	0.21	*	-853	-853 0.32
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	64,641			64,641	41.79	*	27,521	23.95	*	-113,282	-113,282 43.00
Sub Total==>	131,531	0		131,531	85.03	*	95,760	83.33	*	-263,424	-263,424 100.00
Internal Loads						*			*		
Lights	16,086	0		16,086	10.40	*	16,266	14.15	*	0	0.00
People	6,354			6,354	4.11	*	2,891	2.52	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	22,441	0	0	22,441	14.51	*	19,157	16.67	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				724	0.47	*		0.00	*	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*	0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*	0	0.00
						*			*		
Grand Total==>	153,971	0	0	154,695	100.00	*	114,917	100.00	*	-263,424	-263,424 100.00

COOLING COIL SELECTION								AREAS				
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	12.9	154.7	114.0	5,090	75.1	62.7	67.7	54.2	52.2	56.6	Part	330
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	2,789
Totals	12.9	154.7									Wall	4,280
												476 11

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-263.4	5,090	68.0	115.6	Infil	1,627	1,627	0	Clg Cfm/Sqft	1.09	SADB	54.3 115.6
Aux Htg	0.0	0	0.0	0.0	Supply	5,090	5,090	0	Clg Cfm/Ton	394.82	Plenum	75.0 68.0
Preheat	-0.0	5,090	68.0	54.1	Mincfm	0	0	Clg Sqft/Ton	363.50	Return	75.0 68.0	
Reheat	0.0	0	0.0	0.0	Return	5,090	5,090	No. People	14	Runarnd	75.0 68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	1.09	Fn BldTD	0.0 0.0	
Total	-263.4				Auxil	0	0	Htg Btuh/SqFt	-56.22	Fn Frict	0.1 0.0	

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*						
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00
Internal Loads						*						
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*				0	0	0.00
Ret. Fan Heat		0		0	0.00	*				0	0	0.00
Duct Heat Pkup		0		0	0.00	*				0	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*				0	0	0.00
Terminal Bypass		0	0	0	0.00	*				0	0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (\$)
Main Clg	0.0	0.0	0.0	0 0.0 0.0	0.0 0.0 0.0	Part 330	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0	0.0 0.0 0.0	ExFlr 0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0	0.0 0.0 0.0	Roof 3,632	0 0
Totals	0.0	0.0				Wall 5,164	581 11

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA Vent	0.0	--ENGINEERING CHECKS--	--TEMPERATURES (F)--
Main Htg	-320.4	0	0.0	0.0	Infil	0	1,962	Clg Cfm/Sqft	0.00	SADB	0.0 68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0 68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0 68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-320.4				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0 0.0
								Htg Btuh/SqFt	-57.94	Fn Frict	0.0 0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****						HEATING COIL PEAK *****		
Peaked at Time =>			Mo/Hr: 0/ 0			Mo/Hr: 0/ 0			Mo/Hr: 13/ 1					
Outside Air =>			DADB/WB/HR: 0/ 0/ 0.0			DADB: 0			DADB: 4					
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Space Peak (Btuh)	Coil Peak (Btuh)	Percent (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76		
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79		
Partition	0			0	0.00	*	0	0.00	*	0	0	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45		
Sub Total=>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00		
Internal Loads						*			*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0	0	0.00
Sub Total=>	0	0	0	0	0.00	*	0	0.00	*	0	0	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0	0	0.00
Sup. Fan Heat				0	0.00	*			*				0	0.00
Ret. Fan Heat		0		0	0.00	*			*			0	0	0.00
Duct Heat Pkup		0		0	0.00	*			*			0	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0	0	0.00
Exhaust Heat	0	0		0	0.00	*			*			0	0	0.00
Terminal Bypass	0	0		0	0.00	*			*			0	0	0.00
Grand Total=>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00		

COOLING COIL SELECTION-----								AREAS-----			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains			Gross Total Floor	Glass (sf) (%)			
Main Clg	0.0	0.0	0.0 0 0.0	0	0.0	0.0	0.0	1,280			
Aux Clg	0.0	0.0	0.0 0 0.0	0	0.0	0.0	0.0	0	Part	0	
Opt Vent	0.0	0.0	0.0 0 0.0	0	0.0	0.0	0.0	0	ExFlr	0	
Totals	0.0	0.0							Roof	0	0 0
									Wall	1,087	108 10

HEATING COIL SELECTION-----					AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-120.6	1,944	68.0	125.0	Infil	0	1,272	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	1,944	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	1,944	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-120.6				Auxil	0	0	Htg Cfm/Sqft	1.52	Fn BldTD	0.0	0.0
							Htg Btuh/Sqft	-94.19	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/(sqft/F))		
			Summr		Wintr		Summr		Wintr					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67		
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42		
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81		
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06		
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97		
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65		

BUILDING AREAS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

- B U I L D I N G A R E A S -

Room Number	Description	Number of Duplicate		Floor	Total	Exposed		Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Flr	Rm	Area/Dupl Room (sqft)	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)			
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	124	11
2	GUARD OFFICER	1	1	231	231	0	0	0	23	8
3	CELL BLOCK	1	1	459	459	0	0	0	34	10
4	DAY ROOM	1	1	334	334	330	0	0	11	19
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	71	10
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	49	12
7	OFFICER	1	1	127	127	0	0	127	28	12
8	GUARDS DORM	1	1	506	506	0	0	506	28	12
9	FIREMANS DORM	1	1	780	780	0	0	780	69	12
10	2ND FL OFFICE	1	1	220	220	0	0	220	41	13
Zone	1 Total/Ave.				4,686	330	0	0	2,789	476
System	1 Total/Ave.				4,686	330	0	0	2,789	476
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	124	11
2	GUARD OFFICER	1	1	231	231	0	0	0	23	8
3	CELL BLOCK	1	1	459	459	0	0	0	34	10
4	DAY ROOM	1	1	334	334	330	0	0	11	19
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	71	10
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	49	12
7	OFFICER	1	1	127	127	0	0	127	28	12
8	GUARDS DORM	1	1	506	506	0	0	506	28	12
9	FIREMANS DORM	1	1	780	780	0	0	780	69	12
10	2ND FL OFFICE	1	1	220	220	0	0	220	41	13
Zone	1 Total/Ave.				4,686	330	0	0	2,789	476
11	PROVOST MARSHALL	1	1	182	182	0	0	182	23	13
12	NCO	1	1	110	110	0	0	110	14	13
13	GUARDS DORM	1	1	251	251	0	0	251	41	12
14	TOILETS	1	1	300	300	0	0	300	28	10
Zone	2 Total/Ave.				843	0	0	0	843	105
System	2 Total/Ave.				5,529	330	0	0	3,632	581
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	108	10
Zone	3 Total/Ave.				1,280	0	0	0	0	108
System	3 Total/Ave.				1,280	0	0	0	0	108
Building					11,495	659	0	0	6,421	1,165
									11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.6	6	41	-35,218	13	261	351.7	0	0	0.0	0	0
5 - 10	1.3	20	127	-70,435	18	366	703.4	0	0	0.0	0	0
10 - 15	1.9	0	0	-105,653	24	485	1,055.0	0	0	0.0	0	0
15 - 20	2.6	0	0	-140,870	6	121	1,406.7	0	0	0.0	0	0
20 - 25	3.2	7	45	-176,088	0	4	1,758.4	0	0	0.0	0	0
25 - 30	3.9	0	0	-211,306	1	17	2,110.1	0	0	0.0	0	0
30 - 35	4.5	9	60	-246,523	2	36	2,461.7	0	0	0.0	0	0
35 - 40	5.2	4	26	-281,741	0	9	2,813.4	0	0	0.0	0	0
40 - 45	5.8	11	72	-316,958	3	56	3,165.1	0	0	0.0	0	0
45 - 50	6.4	0	0	-352,176	32	637	3,516.8	0	0	0.0	0	0
50 - 55	7.1	0	0	-387,393	0	0	3,868.4	0	0	0.0	0	0
55 - 60	7.7	5	35	-422,611	0	0	4,220.1	0	0	0.0	0	0
60 - 65	8.4	5	35	-457,829	0	0	4,571.8	0	0	0.0	0	0
65 - 70	9.0	0	0	-493,046	0	0	4,923.5	0	0	0.0	0	0
70 - 75	9.7	0	0	-528,264	0	0	5,275.1	100	1,070	0.0	0	0
75 - 80	10.3	2	15	-563,481	0	0	5,626.8	0	0	0.0	0	0
80 - 85	11.0	0	0	-598,699	0	0	5,978.5	0	0	0.0	0	0
85 - 90	11.6	0	0	-633,917	0	0	6,330.2	0	0	0.0	0	0
90 - 95	12.2	6	37	-669,134	0	0	6,681.8	0	0	0.0	0	0
95 - 100	12.9	23	145	-704,352	0	0	7,033.5	0	0	0.0	0	0
Hours Off	0.0	0	8,122	0	0	6,768	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	1	2	3	Zone Number
Max. Temp.	83.0	92.2	94.1	92.7	
Mo./Hr.	7 23	8 24	8 24	8 21	
Day Type	4	1	1	1	
					Number of Hours
Above 100	0	0	0	0	
95 - 100	0	0	0	0	
90 - 95	0	714	1,240	1,220	
85 - 90	0	1,199	1,377	680	
80 - 85	441	1,015	311	827	
75 - 80	2,329	474	744	253	
70 - 75	752	661	187	404	
65 - 70	610	2,091	2,160	288	
60 - 65	364	1,459	1,502	408	
55 - 60	1,209	491	518	530	
50 - 55	610	656	721	919	
Below 50	2,445	0	0	3,231	
Min. Temp.	36.0	55.0	55.0	30.0	
Mo./Hr.	2 10	1 16	1 13	2 10	
Day Type	5	3	3	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	2,986	16	778	3
Feb	2,702	16	736	3
March	3,269	16	482	3
April	2,842	16	162	3
May	3,220	16	0	0
June	4,536	35	0	0
July	5,744	36	0	0
Aug	4,773	35	0	0
Sept	2,927	34	0	0
Oct	3,124	16	66	3
Nov	2,842	16	319	3
Dec	2,844	16	629	3
Total	41,807	36	3,173	3

Building Energy Consumption : 40,013 (Btu/Sq Ft/Year)
Source Energy Consumption : 74,043 (Btu/Sq Ft/Year)

Floor Area : 11,495 (Sq Ft)

**EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS**

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1

REPLACE FLUORESCENT BALLASTS

P HOTH20 778 736 482 162 0 0 0 0 0 66 319 629 3,173
 PK 3.2 3.2 3.2 3.2 0.0 0.0 0.0 0.0 0.0 3.2 3.2 3.2 3.2

1 EQ5020 HEAT WATER CIRC. PUMP C.V.
 ELEC 4 4 3 2 0 0 0 0 0 2 4 20
 PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 35.6 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	19.6	55.17
Sub Total			19.6	55.17
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.4	1.22
Sub Total			0.4	1.22
Sub Total			0.0	0.00

Miscellaneous

Lights	15.5	43.61
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	15.5	43.61
Grand Total	35.6	100.00

** **
** TRACE 600 ANALYSIS **
** **
** by **
** **

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:28:54 1/27/94
Dataset Name: C84008.TM

AIRFLOW - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 PTAC		0	5,028	5,028	6,655	1,627	0	0
2 RAD		0	0	0	0	1,962	0	0
3 UH		0	0	1,944	0	1,272	0	0
Totals		0	5,028	6,972	6,655	4,861	0	0

CAPACITY - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		12.6	0.0	0.0	12.6	-263,424	0	0	0	0	0	0	-263,424
2 RAD		0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	0	-320,361
3 UH		0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	0	-120,567
Totals		12.6	0.0	0.0	12.6	-704,352	0	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 12.5 tons

ENGINEERING CHECKS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Ton	Btuh/ Sq Ft	Floor Area Sq Ft	
1 Main		PTAC	0.00	1.07	398.4	371.2	32.32	1.07	-56.22	4,686	
2 Main		RAD	0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529	
3 Main		UH	0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280	

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4
 * * *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percnt Of Tot (%)	*	Space Sensible (Btuh)	Percnt Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	20,448	0		20,448	13.50	*	20,448	18.19	*	-26,370	-26,370	10.01
Glass Solar	15,990	0		15,990	10.56	*	15,971	14.21	*	0	0	0.00
Glass Cond	5,083	0		5,083	3.36	*	5,178	4.61	*	-25,537	-25,537	9.69
Wall Cond	25,132	0		25,132	16.59	*	26,404	23.49	*	-97,381	-97,381	36.97
Partition	237			237	0.16	*	237	0.21	*	-853	-853	0.32
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	63,925			63,925	42.20	*	27,521	24.49	*	-113,282	-113,282	43.00
Sub Total==>	130,816	0		130,816	86.36	*	95,760	85.21	*	-263,424	-263,424	100.00
Internal Loads						*			*			
Lights	13,584	0		13,584	8.97	*	13,735	12.22	*	0	0	0.00
People	6,354			6,354	4.20	*	2,891	2.57	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	19,938	0	0	19,938	13.16	*	16,627	14.79	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				715	0.47	*		0.00	*	0	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*	0	0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*	0	0	0.00
						*			*			
Grand Total==>	150,754	0	0	151,469	100.00	*	112,387	100.00	*	-263,424	-263,424	100.00

COOLING COIL SELECTION									AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)		
Main Clg	12.6	151.5	111.5	5,028	75.1	62.8	68.1	54.4	52.4	57.0	Part 330
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof 2,789 0 0
Totals	12.6	151.5									Wall 4,280 476 11

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-263.4	5,028	68.0	116.1	Infil	1,627	1,627	0	Clg Cfm/Sqft	1.07	SADB 54.5 116.1
Aux Htg	0.0	0	0.0	0.0	Supply	5,028	5,028	0	Clg Cfm/Ton	398.36	Plenum 75.0 68.0
Preheat	-0.0	5,028	68.0	54.3	MinCfm	0	0	0	Clg Sqft/Ton	371.24	Return 75.0 68.0
Reheat	0.0	0	0.0	0.0	Return	5,028	5,028	0	Clg Btuh/Sqft	32.32	Ret/OA 75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	No. People	14	Runarnd 75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0	Htg % OA	0.0	Fn MtrTD 0.0 0.0
Total	-263.4				Auxil	0	0	0	Htg Cfm/SqFt	1.07	Fn BldTD 0.0 0.0
						0	0	0	Htg Btuh/SqFt	-56.22	Fn Frict 0.1 0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****									
Peaked at Time ==>		Mo/Hr: 0/ 0		* Mo/Hr: 0/ 0 *		Mo/Hr: 13/ 1			
Outside Air ==>		DADB/WB/HR: 0/ 0/ 0.0		* DADB: 0 *		DADB: 4 *			
		Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)
Envelope Loads							*		
Skylite Solr		0	0		0	0.00	*	0	0.00
Skylite Cond		0	0		0	0.00	*	0	0.00
Roof Cond		0	0		0	0.00	*	0	0.00
Glass Solar		0	0		0	0.00	*	0	0.00
Glass Cond		0	0		0	0.00	*	0	0.00
Wall Cond		0	0		0	0.00	*	0	0.00
Partition		0			0	0.00	*	0	0.00
Exposed Floor		0			0	0.00	*	0	0.00
Infiltration		0			0	0.00	*	0	0.00
Sub Total==>		0	0		0	0.00	*	0	0.00
Internal Loads							*		
Lights		0	0		0	0.00	*	0	0.00
People		0			0	0.00	*	0	0.00
Misc		0	0	0	0	0.00	*	0	0.00
Sub Total==>		0	0	0	0	0.00	*	0	0.00
Ceiling Load		0	0		0	0.00	*	0	0.00
Outside Air		0	0	0	0	0.00	*	0	0.00
Sup. Fan Heat					0	0.00	*	0	0.00
Ret. Fan Heat			0		0	0.00	*	0	0.00
Duct Heat Pkup			0		0	0.00	*	0	0.00
OV/UNDR Sizing	0				0	0.00	*	0	0.00
Exhaust Heat		0	0		0	0.00	*	0	0.00
Terminal Bypass		0	0		0	0.00	*	0	0.00
Grand Total==>		0	0	0	0	0.00	*	0	0.00

-----COOLING COIL SELECTION-----									-----AREAS-----		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Gross Total Floor	Glass (sf)	(%)				
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	330	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	3,632	0
Totals	0.0	0.0				5,164			Wall	5,164	581 11

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-320.4	0	0.0	Infil	0	1,962	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	MinCfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-320.4			Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
							Htg Btuh/SqFt	-57.94	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time =>	Mo/Hr: 0 / 0		*	Mo/Hr: 0 / 0		*	Mo/Hr: 13 / 1		*			
Outside Air =>	DAOB/WB/HR: 0 / 0 / 0.0		*	DAOB: 0		*	DAOB: 4		*			
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45
Sub Total=>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total=>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*		0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*		0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*		0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*		0.00
Grand Total=>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Floor	Glass (sf)	(%)			
Main Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0	Part	0				
Aux Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0	ExFlr	0				
Opt Vent	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0	Roof	0	0			
Totals	0.0	0.0			1,280	Wall	1,087	108			

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg	
Main Htg	-120.6	1,944	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,272	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	1,944	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	1,944	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-120.6			Rm Exh	0	0	Htg Cfm/SqFt	1.52	Fn BldTD	0.0	0.0	
				Auxil	0	0	Htg Btuh/SqFt	-94.19	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr		Wintr		Summr		Wintr					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17		
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53		
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23		
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86		
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73		
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27		
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75		
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09		
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70		
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16		
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60		
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67		
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42		
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81		
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13		
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06		
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97		
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50		
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65		

BUILDING AREAS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- BUILDING AREAS -----

Room Number	Description	Floor	Total Area	Partition Area	Exposed Area	Skylight Area	Skl /Rf (%)	Net Roof Area	Window Area		Net Wall Area	
									(sqft)	(%)		
1	GRND FL OFFICES	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.		4,686	330	0	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.		4,686	330	0	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.		4,686	330	0	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.		843	0	0	0	0	0	843	105	12	779
System	2 Total/Ave.		5,529	330	0	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.		1,280	0	0	0	0	0	0	108	10	979
System	3 Total/Ave.		1,280	0	0	0	0	0	0	108	10	979
Building			11,495	659	0	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.6	16	96	-35,218	13	257	348.6	0	0	0.0	0	0
5 - 10	1.3	7	45	-70,435	19	370	697.2	0	0	0.0	0	0
10 - 15	1.9	0	0	-105,653	23	466	1,045.8	0	0	0.0	0	0
15 - 20	2.5	0	0	-140,870	7	140	1,394.4	0	0	0.0	0	0
20 - 25	3.2	7	45	-176,088	0	0	1,743.0	0	0	0.0	0	0
25 - 30	3.8	4	22	-211,306	0	4	2,091.6	0	0	0.0	0	0
30 - 35	4.4	7	42	-246,523	2	37	2,440.2	0	0	0.0	0	0
35 - 40	5.0	8	49	-281,741	1	20	2,788.8	0	0	0.0	0	0
40 - 45	5.7	7	45	-316,958	1	21	3,137.4	0	0	0.0	0	0
45 - 50	6.3	0	0	-352,176	34	677	3,486.0	0	0	0.0	0	0
50 - 55	6.9	2	15	-387,393	0	0	3,834.6	0	0	0.0	0	0
55 - 60	7.6	6	35	-422,611	0	0	4,183.2	0	0	0.0	0	0
60 - 65	8.2	3	20	-457,829	0	0	4,531.8	0	0	0.0	0	0
65 - 70	8.8	0	0	-493,046	0	0	4,880.4	0	0	0.0	0	0
70 - 75	9.5	2	15	-528,264	0	0	5,229.0	100	1,070	0.0	0	0
75 - 80	10.1	0	0	-563,482	0	0	5,577.6	0	0	0.0	0	0
80 - 85	10.7	0	0	-598,699	0	0	5,926.2	0	0	0.0	0	0
85 - 90	11.4	0	0	-633,917	0	0	6,274.8	0	0	0.0	0	0
90 - 95	12.0	6	37	-669,134	0	0	6,623.4	0	0	0.0	0	0
95 - 100	12.6	24	145	-704,352	0	0	6,972.0	0	0	0.0	0	0
Hours Off	0.0	0	8,149	0	0	6,768	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number			
Range	1	1	2	3
(F)				

Max. Temp.	83.0	91.8	93.7	92.3
Mo./Hr.	7 23	8 23	8 23	8 24
Day Type	4	1	1	1

	Number of Hours			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	594	1,232	1,147
85 - 90	0	1,288	1,375	485
80 - 85	441	1,046	321	1,080
75 - 80	2,325	438	744	260
70 - 75	739	663	170	376
65 - 70	619	2,105	2,146	324
60 - 65	356	1,462	1,497	289
55 - 60	1,218	508	549	608
50 - 55	563	656	726	912
Below 50	2,479	0	0	3,279

Min. Temp.	35.9	55.0	55.0	30.0
Mo./Hr.	2 9	1 16	1 13	2 10
Day Type	5	3	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Thrm)	On Peak (Thrm/hr)
Jan	2,522	13	784	3
Feb	2,282	13	741	3
March	2,761	13	489	3
April	2,400	13	171	3
May	2,733	14	0	0
June	3,961	31	0	0
July	5,223	33	0	0
Aug	4,167	32	0	0
Sept	2,484	31	0	0
Oct	2,638	13	68	3
Nov	2,400	13	327	3
Dec	2,402	13	635	3
Total	35,973	33	3,215	3

Building Energy Consumption = 38,654 (Btu/Sq Ft/Year)
Source Energy Consumption = 69,343 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2

REPLACE FLUORESCENT FIXTURES

P HOTH20 784 741 489 171 0 0 0 0 0 68 327 635 3,215
 PK 3.2 3.2 3.2 3.2 0.0 0.0 0.0 0.0 0.0 3.2 3.2 3.2 3.2

1 EQ5020 HEAT WATER CIRC. PUMP C.V.
 ELEC 4 4 3 2 0 0 0 0 0 2 4 20
 PK 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 32.8 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percnt Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	-------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	19.2	58.69
Sub Total			19.2	58.69
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.4	1.31
Sub Total			0.4	1.31
Sub Total			0.0	0.00

Miscellaneous

Lights	13.1	40.00
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	13.1	40.00
Grand Total	32.8	100.00

**
** T R A C E 6 0 0 A N A L Y S I S **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 400

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Reflectance: 0.20
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:47: 7 1/27/94
Dataset Name: C84008 .TM

AIRFLOW - ALTERNATIVE 3
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
1 PTAC		0	3,245	3,245	4,315	1,070	0	0
2 RAD		0	0	0	0	1,291	0	0
3 UH		0	0	916	0	663	0	0
Totals		0	3,245	4,161	4,315	3,024	0	0

CAPACITY - ALTERNATIVE 3
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 PTAC		8.5	0.0	0.0	8.5	-133,581	0	0	0	0	0	0	-133,581
2 RAD		0.0	0.0	0.0	0.0	-165,534	0	0	0	0	0	0	-165,534
3 UH		0.0	0.0	0.0	0.0	-56,839	0	0	0	0	0	0	-56,839
Totals		8.5	0.0	0.0	8.5	-355,953	0	0	0	0	0	0	-355,953

The building peaked at hour 16 month 7 with a capacity of 8.3 tons

ENGINEERING CHECKS - ALTERNATIVE 3
COMBINED ECOS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				
				Cfm/Sq Ft	Cfm/Ton	Sq Ft/Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft		
1 Main	PTAC		0.00	0.69	381.1	550.4	21.80	0.69	-28.51	4,686		
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-29.94	5,529		
3 Main	UH		0.00	0.00	0.0	0.0	0.00	0.72	-44.41	1,280		

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4
 * * *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	12,802	0		12,802	12.53	*	13,334	18.14	*	-18,204	-18,204	13.63
Glass Solar	15,990	0		15,990	15.65	*	16,039	21.82	*	0	0	0.00
Glass Cond	5,023	0		5,023	4.92	*	5,189	7.06	*	-25,537	-25,537	19.12
Wall Cond	3,790	0		3,790	3.71	*	3,869	5.26	*	-14,458	-14,458	10.82
Partition	237			237	0.23	*	237	0.32	*	-853	-853	0.64
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	44,057			44,057	43.12	*	18,302	24.90	*	-74,528	-74,528	55.79
Sub Total==>	81,899	0		81,899	80.16	*	56,969	77.51	*	-133,581	-133,581	100.00
Internal Loads						*			*			
Lights	13,494	0		13,494	13.21	*	13,658	18.58	*	0	0	0.00
People	6,320			6,320	6.19	*	2,868	3.90	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	19,814	0	0	19,814	19.39	*	16,526	22.49	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.45	*			*			
Ret. Fan Heat		0		0	0.00	*			*			
Duct Heat Pkup		0		0	0.00	*			*			
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			*			
Terminal Bypass		0	0	0	0.00	*			*			
Grand Total==>	101,713	0	0	102,174	100.00	*	73,495	100.00	*	-133,581	-133,581	100.00

COOLING COIL SELECTION								AREAS				
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	8.5	102.2	72.7	3,245	75.1	63.0	69.0	54.1	52.1	56.4	Floor	4,686
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	330
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Totals	8.5	102.2									Roof	2,789
											Wall	4,280
												476 11

HEATING COIL SELECTION					AIRFLOWS (cfm)			ENGINEERING CHECKS			TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg		
Main Htg	-133.6	3,245	68.0	105.8	Vent	0	0	Clg Cfm/Sqft	0.69	SADB	54.2	105.8	
Aux Htg	0.0	0	0.0	0.0	Infil	1,070	1,070	Clg Cfm/Ton	381.12	Plenum	75.0	68.0	
Preheat	-0.0	3,245	68.0	54.1	Supply	3,245	3,245	Clg Sqft/Ton	550.35	Return	75.0	68.0	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	21.80	Ret/OA	75.0	68.0	
Humidif	0.0	0	0.0	0.0	Return	3,245	3,245	No. People	14	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-133.6				Rm Exh	0	0	Htg Cfm/SqFt	0.69	Fn BldTD	0.0	0.0	
					Auxil	0	0	Htg Btuh/SqFt	-28.51	Fn Frict	0.1	0.0	

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****									
Peaked at Time ==>	Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0	*	Mo/Hr: 13/ 1		
Outside Air ==>	DADB/WB/HR: 0/ 0/ 0.0			*	DADB: 0	*	DADB: 4		
				*		*			
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Sens (Btu/h)
Envelope Loads						*			Coil Peak Tot Sens (Btu/h)
Skylite Solr	0	0		0	0.00	*	0	0.00	0
Skylite Cond	0	0		0	0.00	*	0	0.00	0
Roof Cond	0	0		0	0.00	*	0	0.00	-26,174
Glass Solar	0	0		0	0.00	*	0	0.00	0
Glass Cond	0	0		0	0.00	*	0	0.00	-31,168
Wall Cond	0	0		0	0.00	*	0	0.00	-17,419
Partition	0			0	0.00	*	0	0.00	-853
Exposed Floor	0			0	0.00	*	0	0.00	0
Infiltration	0			0	0.00	*	0	0.00	-89,919
Sub Total==>	0	0		0	0.00	*	0	0.00	-165,534
Internal Loads						*			100.00
Lights	0	0		0	0.00	*	0	0.00	0
People	0			0	0.00	*	0	0.00	0
Misc	0	0	0	0	0.00	*	0	0.00	0
Sub Total==>	0	0	0	0	0.00	*	0	0.00	0
Ceiling Load	0	0		0	0.00	*	0	0.00	0
Outside Air	0	0	0	0	0.00	*	0	0.00	0
Sup. Fan Heat				0	0.00	*			0.00
Ret. Fan Heat		0		0	0.00	*			0.00
Duct Heat Pkup		0		0	0.00	*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	0
Exhaust Heat	0	0		0	0.00	*			0.00
Terminal Bypass	0	0		0	0.00	*			0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	-165,534
						*			100.00

-----COOLING COIL SELECTION-----								-----AREAS-----		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)			
Main Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	330				
Aux Clg	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0				
Opt Vent	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	3,632	0	0		
Totals	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Wall	5,164	581	11		

-----HEATING COIL SELECTION-----					-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-165.5	0	0.0	0.0	Infil	0	1,291	0.00	Clg Cfm/Sqft	0.00	SAOB	0.0 68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	0.00	Clg Cfm/Ton	0.00	Plenum	0.0 68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	0.00	Clg Sqft/Ton	0.00	Return	0.0 68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	0.00	Clg Btuh/Sqft	0.00	Ret/DA	0.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0.00	No. People	0	Runarnd	0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0.00	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-165.5				Auxil	0	0	0.00	Htg Cfm/SqFt	0.00	Fn BldTD	0.0 0.0
								-29.94	Htg Btuh/SqFt	-29.94	Fn Frict	0.0 0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==>	Mo/Hr: 0 / 0		*	Mo/Hr: 0 / 0	*	Mo/Hr: 13 / 1						
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0		*	OADB: 0	*	OADB: 4						
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	12.22
Wall Cond	0	0		0	0.00	*	0	0.00	*	-3,721	-3,721	6.55
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,171	-46,171	81.23
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-56,839	-56,839	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*		0.00
Ret. Fan Heat			0	0	0.00	*			0.00	*		0.00
Duct Heat Pkup			0	0	0.00	*			0.00	*		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*		0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*		0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-56,839	-56,839	100.00

-----COOLING COIL SELECTION-----								-----AREAS-----			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Grains	Leaving DB/WB/HR Deg F	Deg F	Grains	Gross Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	0	0
Totals	0.0	0.0							Wall	1,087	108 10

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----				--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-56.8	916	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	663	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	916	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	916	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-56.8			0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.72	Fn BldTD	0.0	0.0
				Auxil	0	0	Htg Btuh/SqFt	-44.41	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 3
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)	
			Summr Skylt		Wintr Skylt		Summr Roof		Wintr Windo				
			ExFlr							Wall	Ceil.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77	
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11	
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57	
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94	
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35	
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76	
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50	
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28	
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01	
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79	
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04	
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04	
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77	
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11	
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57	
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94	
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35	
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76	
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50	
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28	
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01	
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79	
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04	
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	157.6	35.06	
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	156.5	34.81	
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	214.0	47.40	
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	155.1	34.51	
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	173.4	38.51	
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.113	0.810	0.837	0.059	0.000	163.6	36.42	
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87	
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87	
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87	
Building		0.144	0.000	0.000	0.000	0.108	0.825	0.853	0.059	0.000	158.0	35.09	

BUILDING AREAS - ALTERNATIVE 3

COMBINED ECOS

- B U I L D I N G A R E A S -

Room Number	Description	Number of Duplicate		Floor	Total	Exposed		Skylight	Skylight /Rf	Net Roof Area	Window Area	Win /Wl	Net Wall Area
		Flr	Rm	Area/Dupl Room (sqft)	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	(%)	(sqft)	(sqft)	(sqft)	(%)	(sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
COMBINED ECOS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.108 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.144 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.130 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.74 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 11.07 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	5	23	-17,798	22	343	208.1	0	0	0.0	0	0
5 - 10	0.9	1	4	-35,595	12	179	416.1	0	0	0.0	0	0
10 - 15	1.3	9	47	-53,393	10	160	624.2	0	0	0.0	0	0
15 - 20	1.7	10	50	-71,191	3	51	832.3	0	0	0.0	0	0
20 - 25	2.1	0	0	-88,988	1	17	1,040.3	0	0	0.0	0	0
25 - 30	2.6	0	0	-106,786	0	4	1,248.4	0	0	0.0	0	0
30 - 35	3.0	9	43	-124,584	1	16	1,456.5	0	0	0.0	0	0
35 - 40	3.4	4	19	-142,381	2	36	1,664.6	0	0	0.0	0	0
40 - 45	3.8	8	38	-160,179	1	23	1,872.6	0	0	0.0	0	0
45 - 50	4.3	1	4	-177,977	46	706	2,080.7	0	0	0.0	0	0
50 - 55	4.7	11	54	-195,774	0	0	2,288.8	0	0	0.0	0	0
55 - 60	5.1	0	0	-213,572	0	0	2,496.8	0	0	0.0	0	0
60 - 65	5.5	6	30	-231,369	0	0	2,704.9	0	0	0.0	0	0
65 - 70	6.0	6	30	-249,167	0	0	2,913.0	0	0	0.0	0	0
70 - 75	6.4	5	23	-266,965	0	0	3,121.0	0	0	0.0	0	0
75 - 80	6.8	0	0	-284,762	0	0	3,329.1	100	1,070	0.0	0	0
80 - 85	7.2	0	0	-302,560	0	0	3,537.2	0	0	0.0	0	0
85 - 90	7.7	0	0	-320,358	0	0	3,745.2	0	0	0.0	0	0
90 - 95	8.1	5	23	-338,155	0	0	3,953.3	0	0	0.0	0	0
95 - 100	8.5	23	114	-355,953	0	0	4,161.4	0	0	0.0	0	0
Hours Off	0.0	0	8,258	0	0	7,225	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number		
Range (F)	1	1	2

Max. Temp.	81.3	93.4	96.4	96.8
Mo./Hr.	7	21	8	20
Day Type	4	2	1	2

Above 100	0	0	0	0	Number of Hours
95 - 100	0	0	476	1,007	
90 - 95	0	1,419	1,451	1,051	
85 - 90	0	801	731	174	
80 - 85	197	1,031	338	390	
75 - 80	2,731	317	816	391	
70 - 75	561	848	409	395	
65 - 70	729	2,179	2,400	454	
60 - 65	770	1,431	1,200	554	
55 - 60	926	529	567	415	
50 - 55	1,013	205	372	1,117	
Below 50	1,833	0	0	2,812	

Min. Temp.	39.6	55.0	55.0	31.9	
Mo./Hr.	2	9	1	16	
Day Type	5	4	4	5	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND (Thrm/hr)
Jan	2,520	13	349	2
Feb	2,280	13	367	2
March	2,759	13	262	2
April	2,399	13	66	2
May	2,699	13	0	0
June	2,872	25	0	0
July	4,369	26	0	0
Aug	3,923	26	0	0
Sept	2,547	25	0	0
Oct	2,638	13	1	0
Nov	2,399	13	152	2
Dec	2,400	13	269	2
Total	33,805	26	1,465	2

Building Energy Consumption = 22,783 (Btu/Sq Ft/Year)
Source Energy Consumption = 47,109 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
COMBINED ECOS

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3 COMBINED ECOS

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 26.5 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	13.1	49.44
Sub Total			13.1	49.44
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.3	1.05
Sub Total			0.3	1.05
Sub Total			0.0	0.00

Miscellaneous

Lights	13.1	49.51
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	13.1	49.51
Grand Total	26.5	100.00

Building 420

Trace Input File

933702

CONTENTS OF : E:\CB420.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 420
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/01/01/GND FLR CL6/3372/1/2/1.0//10.1
14 20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
15 20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
16 20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
17 20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5
18 20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
19 21/M///CBLQTX///CBLQTX
20 24/01/1/770/1//136/37
21 24/01/2/1005/1//136/127
22 24/01/3/565/1//136/217
23 24/02/1/350/1//136/127
24 24/02/2/210/1//136/217
25 24/03/1/896/1//136/37
26 24/03/2/1568/1//136/127
27 24/03/3/897/1//136/217
28 24/03/4/1128/1//136/307
29 24/04/1/196/1//136/127
30 24/04/2/552/1//136/307
31 24/05/1/896/1//136/37
32 24/05/2/1568/1//136/127
33 24/05/3/897/1//136/217
34 24/05/4/552/1//136/307
35 24/06/1/196/1//136/127
36 24/06/2/552/1//136/307
37 25/01/1/68/1/1/.55/.57
38 25/01/2/136/1/1/.55/.57/3
39 25/01/3/57/1/1/.55/.57
40 25/02/1/45/1/1/.55/.57/3
41 25/03/1/99/1/1/.55/.57
42 25/03/2/213/1/1/.55/.57/4
43 25/03/3/99/1/1/0.55/0.57
44 25/03/4/170/1/1/.55/.57
45 25/04/2/75/1/1/0.55/0.57/4
46 25/05/1/99/1/1/0.55/0.57
47 25/05/2/213/1/1/0.55/0.57
48 25/05/3/99/1/1/0.55/0.57
49 25/05/4/170/1/1/0.55/0.57
50 25/06/2/70/1/1/0.55/0.57
51 26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
52 27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
53 29/M/.091/CFM-SF/.091/CFM-SF/.27/CFM-SF/.27/CFM-SF
54 30/01/3900/CFM/3900/CFM///1325/CFM
55 30/03/4500/CFM/4500/CFM///1325/CFM
56 30/05/5000/CFM/5000/CFM///1325/CFM
57 31/01/1/310/1//138/CONSTANT/65/45
58 31/02/1/1140/1//138/CONSTANT/65/45

CONTENTS OF : E:\CB420.TM

LINE # -----

59 31/05/1/4302/1//137/HRLY0ADB
60 31/06/1/1700/1//137/HRLY0ADB
61 33/3/4.5/.75/12.5
62 33/4/6.5/1.0/12.5
63 SYSTEM - 1
64 39/1/BASE BUILDING
65 40/1/FC
66 41/1/01/01/03/03/05/05
67 42/1/0.5/0.5///0.5
68 45/1/CBLQCLG/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
69 48/1///35.7/TONS
70 49/1/792/MBH
71 40/2/RAD
72 41/2/02/02/04/04/06/06
73 42/2///0.5
74 45/2/0FF/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
75 49/2/68/MBH
76 EQUIPMENT - 1
77 59/1/CARLISLE///BASE BUILDING
78 60/1/1/BLKPLANT/1/1
79 62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
80 63/1/5/HP
81 65/1/1//1/2
82 67/1/EQ2101/1/5/HP/860/MBH
83 69/1/EQ4003///EQ4003
84 LOAD - 2
85 19/2/WALL & ROOF INSULATION
86 20/01/01/GND FLR CLG/3372/1/2/1.0//10.1
87 20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
88 20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
89 20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
90 20/05/05/2ND FLR DORM/4598/1/2/1.33/1.6/11.5
91 20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
92 21/M///CBLQTX///CBLQTX
93 24/01/1/770/1//115/37
94 24/01/2/1005/1//115/127
95 24/01/3/565/1//115/217
96 24/02/1/350/1//115/127
97 24/02/2/210/1//115/217
98 24/03/1/896/1//115/37
99 24/03/2/1568/1//115/127
100 24/03/3/897/1//115/217
101 24/03/4/1128/1//115/307
102 24/04/1/196/1//115/127
103 24/04/2/552/1//115/307
104 24/05/1/896/1//115/37
105 24/05/2/1568/1//115/127
106 24/05/3/897/1//115/217
107 24/05/4/552/1//115/307
108 24/06/1/196/1//115/127
109 24/06/2/552/1//115/307
110 25/01/1/68/1/1/.55/.57
111 25/01/2/136/1/1/.55/.57/3
112 25/01/3/57/1/1/.55/.57
113 25/02/1/45/1/1/.55/.57/3
114 25/03/1/99/1/1/.55/.57
115 25/03/2/213/1/1/.55/.57/4
116 25/03/3/99/1/1/0.55/0.57

CONTENTS OF : E:\CB420.TM

LINE #	
117	25/03/4/170/1/1/.55/.57
118	25/04/2/75/1/1/0.55/0.57/4
119	25/05/1/99/1/1/0.55/0.57
120	25/05/2/213/1/1/0.55/0.57
121	25/05/3/99/1/1/0.55/0.57
122	25/05/4/170/1/1/0.55/0.57
123	25/06/2/70/1/1/0.55/0.57
124	26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
125	27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
126	29/M/.091/CFM-SF/.091/CFM-SF/.20/CFM-SF/.20/CFM-SF
127	30/01/3900/CFM/3900/CFM////1325/CFM
128	30/03/4500/CFM/4500/CFM////1325/CFM
129	30/05/5000/CFM/5000/CFM////1325/CFM
130	31/01/1/310/1//115/CONSTANT/65/45
131	31/02/1/1140/1//115/CONSTANT/65/45
132	31/05/1/4302/1//116/HRLYOADB
133	31/06/1/1700/1//116/HRLYOADB
134	33/3/4.5/.75/12.5
135	33/4/6.5/1.0/12.5
136	SYSTEM -- 2
137	39/2/WALL & ROOF INSULATION
138	40/1/FC
139	41/1/01/01/03/03/05/05
140	42/1/0.5/0.5///0.5
141	45/1/CBLQCLG/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
142	48/1///35.7/TONS
143	49/1/792/MBH
144	40/2/RAD
145	41/2/02/02/04/04/06/06
146	42/2///0.5
147	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
148	49/2/68/MBH
149	EQUIPMENT - 2
150	59/2/CARLISLE//WALL & ROOF INSULATION
151	60/1/1/BLKPLANT/1/1
152	62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
153	63/1/5/HP
154	65/1/1//1/2
155	67/1/EQ2101/1/5/HP/860/MBH
156	69/1/EQ4003///EQ4003
157	LOAD - 3
158	19/3/VESTIBULE
159	20/01/01/GND FLR CLG/3372/1/2/1.0//10.1
160	20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
161	20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
162	20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
163	20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5
164	20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
165	21/M///CBLQTX///CBLQTX
166	24/01/1/770/1//136/37
167	24/01/2/1005/1//136/127
168	24/01/3/565/1//136/217
169	24/02/1/350/1//136/127
170	24/02/2/210/1//136/217
171	24/03/1/896/1//136/37
172	24/03/2/1568/1//136/127
173	24/03/3/897/1//136/217
174	24/03/4/1128/1//136/307.

CONTENTS OF : E:\CB420.TM

LINE # -----
175 24/04/1/196/1//136/127
176 24/04/2/552/1//136/307
177 24/05/1/896/1//136/37
178 24/05/2/1568/1//136/127
179 24/05/3/897/1//136/217
180 24/05/4/552/1//136/307
181 24/06/1/196/1//136/127
182 24/06/2/552/1//136/307
183 25/01/1/68/1/1/.55/.57
184 25/01/2/136/1/1/.55/.57/3
185 25/01/3/57/1/1/.55/.57
186 25/02/1/45/1/1/.55/.57/3
187 25/03/1/99/1/1/.55/.57
188 25/03/2/213/1/1/.55/.57/4
189 25/03/3/99/1/1/0.55/0.57
190 25/03/4/170/1/1/.55/.57
191 25/04/2/75/1/1/0.55/0.57/4
192 25/05/1/99/1/1/0.55/0.57
193 25/05/2/213/1/1/0.55/0.57
194 25/05/3/99/1/1/0.55/0.57
195 25/05/4/170/1/1/0.55/0.57
196 25/06/2/70/1/1/0.55/0.57
197 ?6/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
198 27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
199 29/M/.091/CFM-SF/.091/CFM-SF/.26/CFM-SF/.26/CFM-SF
200 30/01/3900/CFM/3900/CFM///1325/CFM
201 30/03/4500/CFM/4500/CFM///1325/CFM
202 30/05/5000/CFM/5000/CFM///1325/CFM
203 31/01/1/310/1//138/CONSTANT/65/45
204 31/02/1/1140/1//138/CONSTANT/65/45
205 31/05/1/4302/1//137/HRLYLOADB
206 31/06/1/1700/1//137/HRLYLOADB
207 33/3/4.5/.75/12.5
208 33/4/6.5/1.0/12.5
209 SYSTEM - 3
210 39/3/VESTIBULE
211 40/1/FC
212 41/1/01/03/03/05/05
213 42/1/0.5/0.5///0.5
214 45/1/CBLQCLG/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
215 48/1///35.7/TONS
216 49/1/792/MBH
217 40/2/RAD
218 41/2/02/04/04/06/06
219 42/2///0.5
220 45/2/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
221 49/2/68/MBH
222 EQUIPMENT - 3
223 59/3/CARLISLE///VESTIBULE
224 60/1/1/BLKPLANT/1/1
225 62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
226 63/1/5/HP
227 65/1/1//1/2
228 67/1/EQ2101/1/5/HP/860/MBH
229 69/1/EQ4003///EQ4003
230 LOAD - 4
231 19/4/COMBINED ECOS
232 20/01/01/GND FLR CLG/3372/1/2/1.0//10.1

CONTENTS OF : E:\CB420.TM

LINE # -----
233 20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
234 20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
235 20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
236 20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5
237 20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
238 21/M///CBLQTX///CBLQTX
239 24/01/1/770/1//115/37
240 24/01/2/1005/1//115/127
241 24/01/3/565/1//115/217
242 24/02/1/350/1//115/127
243 24/02/2/210/1//115/217
244 24/03/1/896/1//115/37
245 24/03/2/1568/1//115/127
246 24/03/3/897/1//115/217
247 24/03/4/1128/1//115/307
248 24/04/1/196/1//115/127
249 24/04/2/552/1//115/307
250 24/05/1/896/1//115/37
251 24/05/2/1568/1//115/127
252 24/05/3/897/1//115/217
253 24/05/4/552/1//115/307
254 24/06/1/196/1//115/127
255 24/06/2/552/1//115/307
256 25/01/1/68/1/1/.55/.57
257 25/01/2/136/1/1/.55/.57/3
258 25/01/3/57/1/1/.55/.57
259 25/02/1/45/1/1/.55/.57/3
260 25/03/1/99/1/1/.55/.57
261 25/03/2/213/1/1/.55/.57/4
262 25/03/3/99/1/1/0.55/0.57
263 25/03/4/170/1/1/.55/.57
264 25/04/2/75/1/1/0.55/0.57/4
265 25/05/1/99/1/1/0.55/0.57
266 25/05/2/213/1/1/0.55/0.57
267 25/05/3/99/1/1/0.55/0.57
268 25/05/4/170/1/1/0.55/0.57
269 25/06/2/70/1/1/0.55/0.57
270 26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
271 27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
272 29/M/.091/CFM-SF/.091/CFM-SF/.19/CFM-SF/.19/CFM-SF
273 30/01/3900/CFM/3900/CFM////1325/CFM
274 30/03/4500/CFM/4500/CFM////1325/CFM
275 30/05/5000/CFM/5000/CFM////1325/CFM
276 31/01/1/310/1//115/CONSTANT/65/45
277 31/02/1/1140/1//115/CONSTANT/65/45
278 31/05/1/4302/1//116/HRLYOAADB
279 31/06/1/1700/1//116/HRLYOAADB
280 33/3/4.5/.75/12.5
281 33/4/6.5/1.0/12.5
282 SYSTEM - 4
283 39/4/COMBINED ECOS
284 40/1/FC
285 41/1/01/01/03/03/05/05
286 42/1/0.5/0.5///0.5
287 45/1/CBLQCLG/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
288 48/1///35.7/TONS
289 49/1/792/MBH
290 40/2/RAD

CONTENTS OF : E:\CB420.TM

LINE # -----
291 41/2/02/02/04/04/06/06
292 42/2//0.5
293 45/2/0FF/0FF/0FF/0FF/CBLQHTG/0FF/0FF/0FF/0FF
294 49/2/68/MBH
295 EQUIPMENT - 4
296 59/4/CARLISLE//COMBINED ECOS
297 60/1/1/BLKPLANT/1/1
298 62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
299 63/1/5/HP
300 65/1/1//1/2
301 67/1/EQ2101/1/5/HP/860/MBH
302 69/1/EQ4003//EQ4003

Building 420

Trace Output File

933702

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 420

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:25:39 2/2/94
Dataset Name: C8420.TM

AIRFLOW - ALTERNATIVE 1

BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 FC		1,144	13,400	13,400	16,300	4,044	0	3,975
2 RAD		0	0	0	0	555	0	0
Totals		1,144	13,400	13,400	16,300	4,599	0	3,975

CAPACITY - ALTERNATIVE 1

BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent. Capacity (Btuh)
1 FC		35.7	0.0	0.0	35.7	-792,000	0	-9,952	0	0	0	0	-792,000
2 RAD		0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	0	-68,000
Totals		35.7	0.0	0.0	35.7	-860,000	0	-9,952	0	0	0	0	-860,000

The building peaked at hour 16 month 7 with a capacity of 23.7 tons

ENGINEERING CHECKS - ALTERNATIVE 1

BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	FC		8.53	1.07	375.4	352.0	34.09	1.07	-63.02			12,568
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-11.11			6,120

System 1 Block FC - FAN COIL

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1
Outside Air ==> DADB/WB/HR: 91/ 73/ 98.0 * DADB: 89 * DADB: 4

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	14.73	*	44,290	23.32	*	0	0	0.00
Glass Cond	10,580	0		10,580	3.71	*	10,032	5.28	*	-51,264	-51,264	10.82
Wall Cond	58,394	9,639		68,033	23.87	*	62,113	32.71	*	-175,355	-204,291	43.12
Partition	1,407			1,407	0.49	*	1,723	0.91	*	-16,207	-16,207	3.42
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	91,799			91,799	32.21	*	44,818	23.60	*	-201,996	-201,996	42.64
Sub Total==>	204,146	9,639		213,785	75.02	*	162,977	85.82	*	-444,821	-473,757	100.00
Internal Loads					*		*	*				
Lights	17,587	0		17,587	6.17	*	17,801	9.37	*	0	0	0.00
People	13,013			13,013	4.57	*	6,683	3.52	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,599	0	0	30,599	10.74	*	24,484	12.89	*	0	0	0.00
Ceiling Load	2,463	-2,463		0	0.00	*	2,434	1.28	*	-6,449	0	0.00
Outside Air	0	0	0	35,859	12.58	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	1.67	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-44	0	-44	-0.02	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	237,209	7,131	0	284,963	100.00	*	189,895	100.00	*	-451,270	-473,757	100.00

--COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB	WB/HR	Grains
Main Clg	35.7	428.4	329.0	13,400	77.0	65.5
Aux Clg	0.0	0.0	0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0
Totals	35.7	428.4				

-----ARFAS

	Gross Total	Glass (sf)	(%)
Floor	12,568		
Part	4,612		
ExFlr	0		
Roof	0	0	0
Wall	10,742	1,423	13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil (cfm)	Airfl	Ent Deg F	Lvg Deg F
Main Htg	-792.0	13,400		44.6	98.9
Aux Htg	0.0		0	0.0	0.0
Preheat	-10.0	13,400		61.0	61.7
Reheat	0.0		0	0.0	0.0
Humidif	0.0		0	0.0	0.0
Opt Vent	0.0		0	0.0	0.0
Total	-792.0				

-----AIRFLOWS (cfm)-----

Type	Cooling	Heating
Vent	1,144	(0)
Infil	2,900	2,900
Supply	13,400	13,400
Mincfm	0	(0)
Return	12,325	13,400
Exhaust	455	(0)
Rm Exh	3.975	(0)
Auxil	0	(0)

--ENGINEERING CHECK

Clg % OA	
Clg Cfm/Sqft	
Clg Cfm/Ton	37
Clg Sqft/Ton	35
Clg BtuH/Sqft	3
No. People	
Htg % OA	
Htg Cfm/SqFt	
Htg BtuH/SqFt	-6

--TEMPERATURES (F)--

Type	Clg	Htg
SADB	62.0	98.9
Plenum	75.6	66.3
Return	75.6	66.3
Rat/OA	76.9	66.3
Runarnd	75.0	68.0
Fn MtrTD	0.1	0.1
Fn BldTD	0.1	0.1
Fn Frict	0.2	0.2

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0	*	Mo/Hr: 13/ 1				
Outside Air ==>	OADB/WB/HR: 0/ 0/ 0.0			*	OADB: 0	*	OADB: 4				
				*		*					
	Space Sens.+Lat. (BtuH)	Ret. Air Sensible (BtuH)	Ret. Air Latent (BtuH)	Net Total (BtuH)	Percent Of Tot (%)	*	Space Sensible (BtuH)	Percent Of Tot (%)	Space Peak Sens (BtuH)	Coil Peak Tot Sens (BtuH)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	7.23
Wall Cond	0	0		0	0.00	*	0	0.00	*	-35,411	-40,758
Partition	0			0	0.00	*	0	0.00	*	-8,463	-8,463
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-38,662	-38,662
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-89,380	-94,727
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,419	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*				0	0.00
Ret. Fan Heat		0		0	0.00	*				0	0.00
Duct Heat Pkup		0		0	0.00	*				0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*				0	0.00
Terminal Bypass		0	0	0	0.00	*				0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-94,799	-94,727
											100.00

COOLING COIL SELECTION								AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Total Floor	Gross Total Glass (sf)	(%)		
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	2,840
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	0
Totals	0.0	0.0					2,056	190	Wall	9

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-68.0	0	0.0	0.0	Infil	0	555	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	64.8
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	63.8
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-68.0				Auxil	0	0	Htg Btuh/SqFt	-11.11	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 1
BASE BUILDING

B U I L D I N G U - V A L U E S

Room U-Values (Btu/hr/sqft/F)											Room Mass	Room Capac.
Room Number	Description	Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Wintr Windo	Wall	Ceil.	(lb/ sqft)	(Btu/ sqft/F)
1	GND FLR CLG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
Zone	1 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
5	2ND FLR DORM	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
Zone	5 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
System	1 Total/Ave.	0.059	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.331	101.0	21.53
2	GRN FLR HTG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
Zone	2 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
6	2ND FLR HTG	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
Zone	6 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
System	2 Total/Ave.	0.069	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.328	58.5	12.26
Building		0.063	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.330	87.1	18.50

BUILDING AREAS - ALTERNATIVE 1

BASE BUILDING

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor Dupl	Floor	Total	Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
			Duplicate Flr	Area/Dupl Room (sqft)	Floor Area (sqft)	Partition Area (sqft)						
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	75	10	673
Zone	4 Total/Ave.				1,700	0	0	0	0	75	10	673
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	70	9	678
Zone	6 Total/Ave.				1,700	1,700	0	0	0	70	9	678
System	2 Total/Ave.				6,120	2,840	0	0	0	190	9	1,866
Building					18,688	7,452	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 1

BASE BUILDING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.370 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.370 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 14.17 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	18	266	-43,493	12	566	670.0	0	0	0.0	0	0
5 - 10	3.6	17	250	-86,995	10	473	1,340.0	0	0	0.0	0	0
10 - 15	5.4	15	231	-130,493	25	1,210	2,010.0	0	0	0.0	0	0
15 - 20	7.1	28	429	-173,990	23	1,128	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	9	141	-217,488	7	336	3,350.0	0	0	0.0	0	0
25 - 30	10.7	6	84	-260,986	7	359	4,020.0	0	0	0.0	0	0
30 - 35	12.5	5	75	-304,483	8	397	4,690.0	0	0	0.0	0	0
35 - 40	14.3	0	0	-347,981	2	87	5,360.0	0	0	0.0	0	0
40 - 45	16.1	0	0	-391,479	0	21	6,030.0	0	0	0.0	0	0
45 - 50	17.9	1	20	-434,976	1	57	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	1	11	-478,474	0	3	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-521,972	1	71	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-565,469	3	149	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-608,967	1	28	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-652,464	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-695,962	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-739,460	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-782,957	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-826,455	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-869,953	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,253	0	0	3,875	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number					
Range (F)	1	3	5	2	4	6
Max. Temp.	78.9	79.2	79.3	90.3	94.8	91.0
Mo./Hr.	7 14	7 14	7 14	8 24	8 23	8 24
Day Type	1	1	1	1	1	1
	Number of Hours					
Above 100	0	0	0	0	0	0
95 - 100	0	0	0	0	0	0
90 - 95	0	0	0	133	1,360	172
85 - 90	0	0	0	2,051	1,362	1,400
80 - 85	0	0	0	863	214	1,200
75 - 80	2,958	2,949	3,140	774	718	558
70 - 75	799	757	617	643	426	512
65 - 70	4,947	4,908	4,916	4,296	4,680	4,918
60 - 65	56	146	87	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0
Min. Temp.	64.6	64.0	64.4	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	3 2	3 2	4 3
Day Type	2	2	2	2	1	2

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	STEAM On Peak (Thrm)	STEAM DMND On Peak (Thrm/hr)
Jan	7,849	18	1,872	6
Feb	7,093	18	1,813	6
March	7,915	18	1,200	5
April	7,426	18	498	1
May	4,155	13	0	0
June	7,675	35	0	0
July	13,127	55	0	0
Aug	7,941	42	0	0
Sept	3,978	29	0	0
Oct	6,561	18	236	1
Nov	7,585	18	842	2
Dec	7,817	18	1,595	5
Total	89,120	55	8,056	6

Building Energy Consumption = 59,386 (Btu/Sq Ft/Year)
Source Energy Consumption = 106,313 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

- EQUIPMENT ENERGY CONSUMPTION -

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 55.0 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1121L	AIR-CLD RECIP 35-60 TONS	41.9	76.25
Sub Total			41.9	76.25
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		3.7	6.76
Sub Total			3.7	6.76
Sub Total			0.0	0.00

Miscellaneous

Lights	9.3	16.99
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	9.3	16.99
Grand Total	55.0	100.00

**
** T R A C E 6 0 0 A N A L Y S I S **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 420

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Reflectance:	0.20
Winter Ground Reflectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0832 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program Was Run: 15:33:49 2 / 2/94
Dataset Name: 08420 .TM

AIRFLOW - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main				Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)		
1 FC	FC	1,144	13,400	13,400	15,548	3,292	0
2 RAD	RAD	0	0	0	0	411	0
Totals		1,144	13,400	13,400	15,548	3,703	3,975

CAPACITY - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating								
		Main Sys.	Aux. Sys.	Opt.	Vent	Cooling Totals	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent Capacity (Btuh)	Heating Totals (Btuh)
		Capacity (Tons)	Capacity (Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	
1 FC	FC	35.7	0.0	0.0	0.0	35.7	-792,000	0	-58,096	0	0	0	-792,000	
2 RAD	RAD	0.0	0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	-68,000	
Totals		35.7	0.0	0.0	0.0	35.7	-860,000	0	-58,096	0	0	0	-860,000	

The building peaked at hour 16 month 7 with a capacity of 15.1 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	FC		8.53	1.07	375.4	352.0	34.09	1.07	-63.02			12,568
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-11.11			6,120

System 1 Block FC - FAN COIL

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==>	Mo/Hr: 7/16		*	Mo/Hr: 7/16		*	Mo/Hr: 13/1		*	Mo/Hr: 13/1		
Outside Air ==>	OADB/WB/HR: 91/ 73/ 98.0		*	OADB: 91		*	OADB: 4		*	OADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads						*						
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	23.23	*	43,128	35.12	*	0	0	0.00
Glass Cond	10,580	0		10,580	5.86	*	10,356	8.43	*	-51,264	-51,264	21.08
Wall Cond	8,988	1,518		10,506	5.82	*	9,130	7.43	*	-29,565	-34,557	14.21
Partition	346			346	0.19	*	483	0.39	*	-7,722	-7,722	3.18
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	53,618			53,618	29.68	*	35,131	28.60	*	-149,627	-149,627	61.53
Sub Total==>	115,497	1,518		117,015	64.78	*	98,227	79.98	*	-238,177	-243,169	100.00
Internal Loads						*			*			
Lights	17,744	0		17,744	9.82	*	17,744	14.45	*	0	0	0.00
People	13,013			13,013	7.20	*	6,479	5.28	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,756	0	0	30,756	17.03	*	24,223	19.72	*	0	0	0.00
Ceiling Load	409	-409		0	0.00	*	364	0.30	*	-1,110	0	0.00
Outside Air	0	0	0	28,105	15.56	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	2.64	*		0.00	*	0	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*		0.00	*	0	0	0.00
Terminal Bypass	0	0	0	0	-0.00	*		0.00	*	0	0	0.00
					*	*		*	*			
Grand Total==>	146,662	1,109	0	180,640	100.00	*	122,814	100.00	*	-239,287	-243,169	100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)							
Main Clg	35.7	428.4	350.5	13,400	76.6	67.2	87.6	66.4	57.3	57.5	Part	12,568	4,612	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Exflr	0	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0	
Totals	35.7	428.4									Wall	10,742	1,423	13

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating Infil	Clg % OA 0A	8.5	Type	Clg	Htg		
Main Htg	-792.0	13,400	30.1	84.4	Infil	2,148	2,148	0	Clg Cfm/Sqft	375.35	SADB	66.6	84.4
Aux Htg	0.0	0	0.0	0.0	Supply	13,400	13,400	0	Clg Cfm/Ton	352.04	Plenum	75.1	67.7
Preheat	-58.1	13,400	62.3	66.3	Mincfm	0	0	0	Clg Sqft/Ton	34.09	Return	75.1	67.7
Reheat	0.0	0	0.0	0.0	Return	11,573	13,400	No. People	Clg Btuh/Sqft	35	Ret/0A	76.4	67.7
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	0	Htg % OA	0.0	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	3,975	0	0	Htg Cfm/SqFt	1.07	Fn MtrTD	0.1	0.1
Total	-792.0				Auxil	0	0	0	Htg Btuh/SqFt	-63.02	Fn BldTD	0.1	0.1
									Htg Frict	0.2	Fn Frict	0.2	0.2

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==>	Mo/Hr: 0/ 0		*	Mo/Hr: 0/ 0		*	Mo/Hr: 13/ 1				
Outside Air ==>	DADB/WB/HR: 0/ 0/ 0.0		*	DADB: 0		*	DADB: 4				
	Space Sens.+Lat. (BtuH)	Ret. Air Sensible (BtuH)	Ret. Air Latent (BtuH)	Net Total (BtuH)	Percent Of Tot (%)	*	Space Sensible (BtuH)	Percent Of Tot (%)	Space Peak Space Sens (BtuH)	Coil Peak Tot Sens (BtuH)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845 14.62
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,970	-6,915 14.77
Partition	0			0	0.00	*	0	0.00	*	-4,408	-4,408 9.42
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-28,638	-28,638 61.18
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-45,862	-46,806 100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-947	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00		0.00
Ret. Fan Heat		0		0	0.00	*			0.00		0.00
Duct Heat Pkup		0		0	0.00	*			0.00		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00		0.00
Terminal Bypass		0	0	0	0.00	*			0.00		0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-46,809	-46,806 100.00

-----COOLING COIL SELECTION----- AREAS-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	Part	2,840	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	Roof	0	0 0
Totals	0.0	0.0			Wall	2,056	190 9

-----HEATING COIL SELECTION----- AIRFLOWS (cfm)----- ENGINEERING CHECKS-- TEMPERATURES (F)---

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type Vent	Cooling 0	Heating 0	Clg % DA 0.0	0.0	Type, Clg Htg
Main Htg	-68.0	0	0.0	0.0	Infil	0	411	Clg Cfm/Sqft	0.00 SADB 0.0 68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00 Plenum 0.0 67.4
Preheat	0.0	0	0.0	0.0	Minefm	0	0	Clg Sqft/Ton	0.00 Return 0.0 67.2
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00 Ret/DA 0.0 67.2
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0 Runarnd 0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % DA	0.0 Fn MtrID 0.0 0.0
Total	-68.0				Auxil	0	0	Htg Cfm/SqFt	0.00 Fn BldTD 0.0 0.0
						0	Htg Btuh/SqFt	-11.11 Fn Frict 0.0 0.0	

BUILDING U-VALUES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)
			Summr ExFlr	Wintr Skylt	Summr Skylt	Roof Windo	Wintr Windo	Wall	Ceil.			
1	GND FLR CLG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
Zone	1 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
5	2ND FLR DORM	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
Zone	5 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
System	1 Total/Ave.	0.029	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.331	104.9	22.36
2	GRN FLR HTG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
Zone	2 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
6	2ND FLR HTG	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
Zone	6 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
System	2 Total/Ave.	0.039	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.328	73.0	15.49
Building		0.033	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.330	94.5	20.11

BUILDING AREAS - ALTERNATIVE 2

WALL & ROOF INSULATION

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor Dupl	Floor	Total	Exposed			Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)	
			Area/Dupl	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)				
Flr	Rm	(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(%)	(sqft)	
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	581	15	3,332
System	1 Total/Ave.			12,568	12,568	4,612	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	75	10	673
Zone	4 Total/Ave.				1,700	0	0	0	0	75	10	673
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	70	9	678
Zone	6 Total/Ave.				1,700	1,700	0	0	0	70	9	678
System	2 Total/Ave.			6,120	6,120	2,840	0	0	0	190	9	1,866
Building				18,688	18,688	7,452	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 2

WALL & ROOF INSULATION

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.120 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.120 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVW) = 10.93 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (cfm)	Hours (%)	Hours	Cap. (cfm)	Hours (%)	Hours
0 - 5	1.8	37	533	-45,905	19	803	670.0	0	0	0.0	0	0
5 - 10	3.6	17	250	-91,810	50	2,153	1,340.0	0	0	0.0	0	0
10 - 15	5.4	23	340	-137,714	14	604	2,010.0	0	0	0.0	0	0
15 - 20	7.1	17	241	-183,619	11	481	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	4	60	-229,524	2	81	3,350.0	0	0	0.0	0	0
25 - 30	10.7	0	0	-275,429	2	87	4,020.0	0	0	0.0	0	0
30 - 35	12.5	0	0	-321,334	3	118	4,690.0	0	0	0.0	0	0
35 - 40	14.3	1	20	-367,238	0	0	5,360.0	0	0	0.0	0	0
40 - 45	16.1	1	11	-413,143	0	0	6,030.0	0	0	0.0	0	0
45 - 50	17.9	0	0	-459,048	0	0	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	0	0	-504,953	0	0	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-550,858	0	0	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-596,762	0	0	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-642,667	0	0	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-688,572	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-734,477	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-780,382	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-826,286	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-872,191	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-918,096	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,305	0	0	4,433	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number					
Range (F)	1	3	5	2	4	6
Max. Temp.	78.4	78.7	78.9	90.9	102.4	95.6
Mo./Hr.	7 14	7 14	7 14	9 20	9 20	8 21
Day Type	1	1	1	5	1	2
	Number of Hours					
Above 100	0	0	0	0	1,464	0
95 - 100	0	0	0	0	489	621
90 - 95	0	0	0	720	461	1,587
85 - 90	0	0	0	1,644	704	250
80 - 85	0	0	0	1,226	459	922
75 - 80	2,928	2,940	3,019	1,137	399	438
70 - 75	1,216	1,144	1,105	1,153	833	598
65 - 70	4,616	4,676	4,636	2,880	3,951	4,344
60 - 65	0	0	0	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0
Min. Temp.	66.5	66.1	66.4	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	3 6	3 22	3 3
Day Type	2	2	2	3	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	STEAM	STEAM DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Thrm)	On Peak (Thrm/hr)
Jan	7,848	18	927	3
Feb	7,090	18	925	3
March	7,912	18	580	2
April	6,391	18	193	1
May	4,152	13	0	0
June	6,894	28	0	0
July	10,456	42	0	0
Aug	7,278	34	0	0
Sept	3,976	28	0	0
Oct	4,624	18	30	1
Nov	7,483	18	355	1
Dec	7,815	18	753	3
Total	81,920	42	3,762	3

Building Energy Consumption = 35,093 (Btu/Sq Ft/Year)
Source Energy Consumption = 71,730 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2 WALL & ROOF INSULATION

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2

WALL & ROOF INSULATION

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 42.4 (kW)
Yearly Time of Peak 16 (hr) 7 (m)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1121L	AIR-CLD RECIP 35-60 TONS	29.3	69.17
Sub Total			29.3	69.17
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		3.7	8.78
Sub Total			3.7	8.78
Sub Total			0.0	0.00

Miscellaneous

Lights	9.3	22.06
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	9.3	22.06
Grand Total	42.4	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 420

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:42:53 2/2/94
Dataset Name: CB420.TM

AIRFLOW - ALTERNATIVE 3

VESTIBULE

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 FC	FC	1,144	13,400	13,400	16,193	3,937	0	3,975
2 RAD	RAD	0	0	0	0	535	0	0
Totals		1,144	13,400	13,400	16,193	4,471	0	3,975

CAPACITY - ALTERNATIVE 3

VESTIBULE

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 FC	FC	35.7	0.0	0.0	35.7	-792,000	0	-11,597	0	0	0	0	-792,000
2 RAD	RAD	0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	0	-68,000
Totals		35.7	0.0	0.0	35.7	-860,000	0	-11,597	0	0	0	0	-860,000

The building peaked at hour 16 month 7 with a capacity of 23.4 tons

ENGINEERING CHECKS - ALTERNATIVE 3

VESTIBULE

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	FC		8.53	1.07	375.4	352.0	34.09	1.07	-63.02	12,568	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-11.11	6,120	

System 1 Block FC - FAN COIL

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 89 * OADB: 4

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	14.92	*	44,290	23.53	*	0	0	0.00
Glass Cond	10,580	0		10,580	3.76	*	10,032	5.33	*	-51,264	-51,264	10.99
Wall Cond	58,394	9,637		68,031	24.19	*	62,113	32.99	*	-175,355	-204,291	43.81
Partition	1,407			1,407	0.50	*	1,723	0.92	*	-16,207	-16,207	3.48
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	88,164			88,164	31.34	*	43,158	22.93	*	-194,515	-194,515	41.72
Sub Total=>	200,511	9,637		210,148	74.71	*	161,317	85.69	*	-437,340	-466,276	100.00
Internal Loads					*			*				
Lights	17,587	0		17,587	6.25	*	17,801	9.46	*	0	0	0.00
People	13,013			13,013	4.63	*	6,683	3.55	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total=>	30,599	0	0	30,599	10.88	*	24,484	13.01	*	0	0	0.00
Ceiling Load	2,480	-2,480		0	0.00	*	2,450	1.30	*	-6,449	0	0.00
Outside Air	0	0	0	35,763	12.71	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	1.69	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total=>	233,591	7,157	0	281,275	100.00	*	188,251	100.00	*	-443,789	-466,276	100.00

---COOLING COIL SELECTION---

-----HEATING COIL SELECTION-----

System	HEATING COIL SELECTION				WALL LENGTH (ft.m)		ENCLOSURE COOLING		VENTILATION COOLING (%)			
	Capacity (Mbh)	Coil (cfm)	Airfl Ent Deg F	Lvg Deg F	Type Vent	Cooling 1,144	Heating 0	Clg % OA Clg Cfm/Sqft	8.5	Type SADB	Clg 62.1	Htg 98.4
Main Htg	-792.0	13,400	44.1	98.4	Infil	2,793	2,793	Clg Cfm/Ton	375.35	Plenum	75.6	66.3
Aux Htg	0.0	0	0.0	0.0	Supply	13,400	13,400	Clg Sqft/Ton	352.04	Return	75.6	66.3
Preheat	-11.6	13,400	61.0	61.8	Mincfm	0	0	Clg Btuh/Sqft	34.09	Ret/OA	76.9	66.3
Reheat	0.0	0	0.0	0.0	Return	12,218	13,400	No. People	35	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	371	0	Htg % OA	0.0	Fn MtrTD	0.1	0.1
Opt Vent	0.0	0	0.0	0.0	Rm Exh	3,975	0	Htg Cfm/SqFt	1.07	Fn BldTD	0.1	0.1
Total	-792.0				Auxil	0	0	Htg Btuh/SqFt	-63.02	Fn Frict	0.2	0.2

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==>	Mo/Hr: 0/ 0		*	Mo/Hr: 0/ 0		*	Mo/Hr: 13/ 1				
Outside Air ==>	OADB/WB/HR: 0/ 0/ 0.0		*	OADB: 0		*	OADB: 4				
	Space Sens. & Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845
Wall Cond	0	0		0	0.00	*	0	0.00	*	-35,411	-40,758
Partition	0			0	0.00	*	0	0.00	*	-8,463	-8,463
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-37,230	-37,230
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-87,948	-93,295
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,419	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*				0	0.00
Ret. Fan Heat		0		0	0.00	*				0	0.00
Duct Heat Pkup		0		0	0.00	*				0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*				0	0.00
Terminal Bypass		0	0	0	0.00	*				0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-93,367	-93,295
<hr/>											

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	Part	2,840	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	Roof	0	0 0
Totals	0.0	0.0			Wall	2,056	190 9

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0.0	0.0	Type	Clg	Htg	
Main Htg	-68.0	0	0.0	0.0	Infil	0	535	Clg Cfm/Ton	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Plenum	0.0	64.8
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	63.8
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Ret/OA	0.0	63.8
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-68.0				Auxil	0	0	Htg Btuh/SqFt	-11.11	Fn Frict	0.0	0.0

-----AREAS-----

BUILDING U-VALUES - ALTERNATIVE 3
VESTIBULE

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)	
		Summr		Wintr		Summr		Wintr				
		Part.	ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.		
1	GND FLR CLG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
Zone	1 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
5	2ND FLR DORM	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
Zone	5 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
System	1 Total/Ave.	0.059	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.331	101.0	21.53
2	GRN FLR HTG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
Zone	2 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
6	2ND FLR HTG	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
Zone	6 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
System	2 Total/Ave.	0.069	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.328	58.5	12.26
Building		0.063	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.330	87.1	18.50

BUILDING AREAS - ALTERNATIVE 3

VESTIBULE

----- BUILDING AREAS -----

Room Number	Description	Floor Area/Duplicate Room		Total Floor Area	Partition Area	Exposed Floor Area	Skylight Area	Skl /Rf (%)	Net Roof Area	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Flr	Rm	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(%)	(sqft)
1 Zone	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	261	11	2,079
	1 Total/Ave.				3,372	310	0	0	0	261	11	2,079
3 Zone	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	581	13	3,908
	3 Total/Ave.				4,598	0	0	0	0	581	13	3,908
5 Zone	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	581	15	3,332
	5 Total/Ave.				4,598	4,302	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	1,423	13	9,319
2 Zone	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	45	8	515
	2 Total/Ave.				2,720	1,140	0	0	0	45	8	515
4 Zone	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	75	10	673
	4 Total/Ave.				1,700	0	0	0	0	75	10	673
6 Zone	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	70	9	678
	6 Total/Ave.				1,700	1,700	0	0	0	70	9	678
System	2 Total/Ave.				6,120	2,840	0	0	0	190	9	1,866
Building					18,688	7,452	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 3

VESTIBULE

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.370 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.370 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 14.17 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
VESTIBULE

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load ----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	16	246	-43,580	12	563	670.0	0	0	0.0	0	0
5 - 10	3.6	18	270	-87,160	10	497	1,340.0	0	0	0.0	0	0
10 - 15	5.4	15	231	-130,739	25	1,225	2,010.0	0	0	0.0	0	0
15 - 20	7.1	28	418	-174,319	22	1,090	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	10	152	-217,899	6	305	3,350.0	0	0	0.0	0	0
25 - 30	10.7	6	84	-261,479	7	359	4,020.0	0	0	0.0	0	0
30 - 35	12.5	5	75	-305,059	8	397	4,690.0	0	0	0.0	0	0
35 - 40	14.3	0	0	-348,639	2	87	5,360.0	0	0	0.0	0	0
40 - 45	16.1	0	0	-392,218	0	21	6,030.0	0	0	0.0	0	0
45 - 50	17.9	1	20	-435,798	1	57	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	1	11	-479,378	0	3	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-522,958	1	71	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-566,538	3	149	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-610,118	1	28	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-653,698	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-697,277	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-740,857	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-784,437	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-828,017	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-871,597	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,253	0	0	3,908	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
VESTIBULE

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number					
Range (F)	1	3	5	2	4	6
Max. Temp.	78.9	79.2	79.3	90.3	94.8	91.0
Mo./Hr.	7 14	7 14	7 14	8 24	8 23	8 24
Day Type	1	1	1	1	1	1
	Number of Hours					
Above 100	0	0	0	0	0	0
95 - 100	0	0	0	0	0	0
90 - 95	0	0	0	133	1,360	172
85 - 90	0	0	0	2,051	1,362	1,400
80 - 85	0	0	0	863	214	1,200
75 - 80	2,983	2,990	3,167	797	735	558
70 - 75	774	716	590	636	413	512
65 - 70	4,947	4,908	4,916	4,280	4,676	4,918
60 - 65	56	146	87	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0
Min. Temp.	64.6	64.1	64.5	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	3 2	4 4	2 7
Day Type	2	2	2	2	2	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
VESTIBULE

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	STEAM	STEAM DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Thrm)	On Peak (Thrm/hr)
Jan	7,849	18	1,845	6
Feb	7,092	18	1,784	6
March	7,914	18	1,178	5
April	7,425	18	483	1
May	4,155	13	0	0
June	7,747	35	0	0
July	13,117	55	0	0
Aug	7,968	41	0	0
Sept	3,978	29	0	0
Oct	6,475	18	223	1
Nov	7,585	18	829	2
Dec	7,816	18	1,573	5
Total	89,122	55	7,914	6

Building Energy Consumption = 59,624 (Btu/Sq Ft/Year)
Source Energy Consumption = 105,297 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
VESTIBULE

- EQUIPMENT ENERGY CONSUMPTION -

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3

VESTIBULE

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
VESTIBULE

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 54.6 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1121L	AIR-CLD RECIP 35-60 TONS	41.6	76.09
Sub Total			41.6	76.09
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		3.7	6.81
Sub Total			3.7	6.81
Sub Total			0.0	0.00

Miscellaneous

Lights	9.3	17.11
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	9.3	17.11
Grand Total	54.6	100.00

**
** TRACE 600 ANALYSIS **
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 420

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:51:31 2/2/94
Dataset Name: CB420.TM

AIRFLOW - ALTERNATIVE 4

COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
1 FC		1,144	13,400	13,400	15,441	3,185	0	3,975
2 RAD		0	0	0	0	391	0	0
Totals		1,144	13,400	13,400	15,441	3,575	0	3,975

CAPACITY - ALTERNATIVE 4

COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 FC		35.7	0.0	0.0	35.7	-792,000	0	-59,823	0	0	0	-792,000
2 RAD		0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	-68,000
Totals		35.7	0.0	0.0	35.7	-860,000	0	-59,823	0	0	0	-860,000

The building peaked at hour 16 month 7 with a capacity of 14.9 tons

ENGINEERING CHECKS - ALTERNATIVE 4

COMBINED ECOS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent	Cooling				Heating			
				Outside Air	Cfm/ Sq Ft	Cfm/ Ton	Sq Ft/ Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	Floor Area Sq Ft
1 Main		FC	8.53	1.07	375.4	352.0	34.09	1.07	-63.02	12,568	
2 Main		RAD	0.00	0.00	0.0	0.0	0.00	0.00	-11.11	6,120	

System 1 Block FC - FAN COIL

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****												
Peaked at Time ==>			Mo/Hr: 7/16			Mo/Hr: 7/16			Mo/Hr: 13/1			
Outside Air ==>			OADB/WB/HR: 91/ 73/ 98.0			OADB: 91			OADB: 4			
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads						*						
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	23.44	*	44,290	36.58	*	0	0	0.00
Glass Cond	10,580	0		10,580	5.91	*	10,133	8.37	*	-51,264	-51,264	21.75
Wall Cond	8,988	1,518		10,505	5.87	*	9,288	7.67	*	-29,565	-34,557	14.66
Partition	346			346	0.19	*	483	0.40	*	-7,722	-7,722	3.28
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	51,661			51,661	28.86	*	32,167	26.57	*	-142,145	-142,145	60.31
Sub Total==>	113,541	1,518		115,058	64.27	*	96,360	79.58	*	-230,696	-235,688	100.00
Internal Loads						*			*			
Lights	17,744	0		17,744	9.91	*	17,744	14.65	*	0	0	0.00
People	13,013			13,013	7.27	*	6,597	5.45	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,756	0	0	30,756	17.18	*	24,340	20.10	*	0	0	0.00
Ceiling Load	412	-412		0	0.00	*	386	0.32	*	-1,110	0	0.00
Outside Air	0	0	0	28,438	15.89	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	2.66	*		0.00	*	0	0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*	0	0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*	0	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*	0	0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*	0	0	0.00
					*			*				
Grand Total==>	144,709	1,106	0	179,017	100.00	*	121,086	100.00	*	-231,806	-235,688	100.00

-----COOLING COIL SELECTION-----										-----AREAS-----		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)			
Main Clg	35.7	428.4	349.3	13,400	76.6	67.1	87.1	66.5	57.2	56.9	Part	4,612
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0
Totals	35.7	428.4									Wall	10,742
												1,423 13

-----HEATING COIL SELECTION-----					-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	8.5	Type	Clg	Htg	
Main Htg	-792.0	13,400	29.6	83.9	Infil	2,041	2,041	0	Clg Cfm/Sqft	1.07	SADB	66.7 83.9
Aux Htg	0.0	0	0.0	0.0	Supply	13,400	13,400	0	Clg Cfm/Ton	375.35	Plenum	75.1 67.7
Preheat	-59.8	13,400	62.3	66.4	Mincfm	0	0	0	Clg Sqft/Ton	352.04	Return	75.1 67.7
Reheat	0.0	0	0.0	0.0	Return	11,466	13,400	No. People	34.09	Ret/OA	76.4 67.7	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	35	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	3,975	0	0.0	Htg Cfm/SqFt	1.07	Fn MtrTD	0.1 0.1
Total	-792.0				Auxil	0	0	Htg Btu/SqFt	-63.02	Fn BldTD	0.1 0.1	
								Fn Frict	0.2 0.2			

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>			Mo/Hr: 0/ 0			* Mo/Hr: 0/ 0			* Mo/Hr: 13/ 1		
Outside Air ==>			DADB/WB/HR: 0/ 0/ 0.0			* DADB: 0			* DADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845 15.09
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,970	-6,915 15.24
Partition	0			0	0.00	*	0	0.00	*	-4,408	-4,408 9.72
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0 0.00
Infiltration	0			0	0.00	*	0	0.00	*	-27,206	-27,206 59.96
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-44,430	-45,374 100.00
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	*	0	0 0.00
People	0			0	0.00	*	0	0.00	*	0	0 0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-947	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sup. Fan Heat				0	0.00	*			0.00		0 0.00
Ret. Fan Heat		0		0	0.00	*			0.00		0 0.00
Duct Heat Pkup		0		0	0.00	*			0.00		0 0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0 0.00
Exhaust Heat		0	0	0	0.00	*			0.00		0 0.00
Terminal Bypass		0	0	0	0.00	*			0.00		0 0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-45,377	-45,374 100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Grains	Leaving DB/WB/HR Deg F	Deg F	Grains	Gross Total Flcor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	2,840	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	0.0	0.0							Wall	2,056	190 9

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-68.0	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0 68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0 67.4
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0 67.2
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0 67.2
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-68.0				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0 0.0
						0	Htg Btuh/SqFt	-11.11	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)
			Summr ExFlr	Wintr Skylt	Summr Skylt	Roof	Windo	Windo	Wall	Ceil.		
1	GND FLR CLG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
Zone	1 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
5	2ND FLR DORM	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
Zone	5 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
System	1 Total/Ave.	0.029	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.331	104.9	22.36
2	GRN FLR HTG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
Zone	2 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
6	2ND FLR HTG	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
Zone	6 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
System	2 Total/Ave.	0.039	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.328	73.0	15.49
Building		0.033	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.330	94.5	20.11

BUILDING AREAS - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING AREAS -----

Room Number	Description	Floor		Total	Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Duplicate Flr	Rm	Area/Dupl Room (sqft)	Floor Area (sqft)	Partition Area (sqft)						
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	i	2,720	2,720	1,140	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	75	10	672
Zone	4 Total/Ave.				1,700	0	0	0	0	75	10	672
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	70	9	672
Zone	6 Total/Ave.				1,700	1,700	0	0	0	70	9	672
System	2 Total/Ave.				6,120	2,840	0	0	0	190	9	1,860
Building					18,688	7,452	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
COMBINED ECOS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.120 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.120 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 10.93 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	39	578	-45,991	20	869	670.0	0	0	0.0	0	0
5 - 10	3.6	16	242	-91,982	48	2,078	1,340.0	0	0	0.0	0	0
10 - 15	5.4	23	348	-137,974	15	663	2,010.0	0	0	0.0	0	0
15 - 20	7.1	16	241	-183,965	9	407	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	4	60	-229,956	2	85	3,350.0	0	0	0.0	0	0
25 - 30	10.7	0	0	-275,947	2	71	4,020.0	0	0	0.0	0	0
30 - 35	12.5	0	0	-321,938	3	118	4,690.0	0	0	0.0	0	0
35 - 40	14.3	1	20	-367,929	0	0	5,360.0	0	0	0.0	0	0
40 - 45	16.1	1	11	-413,921	0	0	6,030.0	0	0	0.0	0	0
45 - 50	17.9	0	0	-459,912	0	0	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	0	0	-505,903	0	0	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-551,894	0	0	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-597,885	0	0	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-643,876	0	0	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-689,868	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-735,859	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-781,850	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-827,841	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-873,832	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-919,824	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,260	0	0	4,469	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	3	5	2	4	6	Zone Number
Max. Temp.	78.4	78.7	78.9	91.0	102.5	95.6	
Mo./Hr.	7 14	7 14	7 14	9 21	9 22	8 21	
Day Type	1	1	1	5	1	2	
							Number of Hours
Above 100	0	0	0	0	1,464	0	
95 - 100	0	0	0	0	489	621	
90 - 95	0	0	0	720	478	1,587	
85 - 90	0	0	0	1,692	699	267	
80 - 85	0	0	0	1,240	476	917	
75 - 80	2,928	2,948	3,044	1,260	370	436	
70 - 75	1,248	1,144	1,124	968	845	636	
65 - 70	4,584	4,668	4,592	2,880	3,939	4,296	
60 - 65	0	0	0	0	0	0	
55 - 60	0	0	0	0	0	0	
50 - 55	0	0	0	0	0	0	
Below 50	0	0	0	0	0	0	
Min. Temp.	66.6	66.2	66.5	67.9	67.9	67.9	
Mo./Hr.	2 15	2 15	2 15	2 23	3 22	3 21	
Day Type	2	2	2	1	1	1	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	STEAM	STEAM DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	7,847	18	898	3
Feb	7,090	18	895	3
March	7,912	18	558	2
April	6,291	18	178	1
May	4,152	13	0	0
June	7,021	28	0	0
July	10,451	42	0	0
Aug	7,300	34	0	0
Sept	4,074	28	0	0
Oct	4,573	18	25	1
Nov	7,483	18	340	1
Dec	7,815	18	730	3
Total	82,009	42	3,624	3

Building Energy Consumption = 34,367 (Btu/Sq Ft/Year)
Source Energy Consumption = 70,790 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
COMBINED ECOS

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 42.0 (kW)
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eq.	Ref.	Equipment Num.	Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment						
1		EQ1121L		AIR-CLD RECIP 35-60 TONS	28.9	68.89
				Sub Total	28.9	68.89
				Sub Total	0.0	0.00
Air Moving Equipment						
1				SUMMATION OF FAN ELECTRICAL DEMAND	3.7	8.86
				Sub Total	3.7	8.86
				Sub Total	0.0	0.00
Miscellaneous						
				Lights	9.3	22.25
				Base Utilities	0.0	0.00
				Misc Equipment	0.0	0.00
				Sub Total	9.3	22.25
				Grand Total	42.0	100.00

Building 452

Trace Input File

933702

CONTENTS OF : E:\CB452.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 452
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11//ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
14 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
15 20/03/01/ASSEMBLY/2063/1/3/2/2
16 20/04/02/NAVE/4935/1/3/0/0/25
17 20/05/03/CLASS RM/1310/1/3/2/2
18 20/06/03/CLASS RM/1664/1/3/2/2
19 20/07/03/VESTIBULE/128/1/3/2/2
20 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
21 21/01///CBADCTX///CBADHTX/ROOM
22 21/02///CBADCTX///CBADHTX/ROOM
23 21/03///CBADCTX///CBADHTX/ROOM
24 21/04///CBCHCTX///CBCHHTX/ROOM
25 21/05///CBADCTX///CBADHTX/ROOM
26 21/06///CBADCTX///CBADHTX/ROOM
27 21/07///CBADCTX///CBADHTX/ROOM
28 21/08///CBADHTX/ROOM
29 22/01/1/NO/130/15//154/135
30 22/02/1/NO/150/17//154/315
31 22/03/1/NO/43/22//154/45
32 22/03/2/NO/43/22//154/225
33 22/04/1/NO/103/26//111/45
34 22/04/2/NO/103/26//111/225
35 22/05/1/NO/86/21//154/45
36 22/06/1/NO/106/21//154/225
37 22/07/1/NO/18/5.5//154/45
38 22/07/2/NO/18/5.5//154/225
39 22/08/1/YES///146
40 24/01/1/168/1/1/114/45
41 24/01/2/1365/1/1/114/135
42 24/02/1/168/1/1/114/45
43 24/02/2/1610/1/1/114/315
44 24/03/1/559/1/1/114/45
45 24/03/2/520/1/1/114/135
46 24/03/3/559/1/1/114/225
47 24/04/1/1430/1/1/114/45
48 24/04/2/1056/1/1/114/135
49 24/04/3/2040/1/1/114/225
50 24/04/4/705/1/1/114/315
51 24/05/1/860/1/1/114/45
52 24/05/2/170/1/1/114/315
53 24/06/1/150/1/1/114/135
54 24/06/2/1060/1/1/114/225
55 24/06/3/170/1/1/114/315
56 24/07/1/120/1/1/114/45
57 24/07/2/120/1/1/114/225
58 24/08/1/810/1/1/114/45

CONTENTS OF : E:\CB452.TM

LINE # -----
59 24/08/2/170/1/1/114/135
60 24/08/3/540/1/1/114/225
61 24/08/4/480/1/1/114/315
62 25/01/2///25/.56/.82
63 25/02/2///25/.56/.82
64 25/03/1///20/.56/.82
65 25/03/2///20/.56/.82
66 25/03/3///20/.56/.82
67 25/04/1///40/.56/.82
68 25/04/2///28/.56/.82
69 25/04/3///45/.56/.82
70 25/04/4///28/.56/.82
71 25/05/1///20/.56/.82
72 25/05/2///5/.56/.82
73 25/06/1///5/.56/.82
74 25/06/2///20/.56/.82
75 25/07/1///80/.56/.82
76 25/07/2///80/.56/.82
77 26/01/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
78 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
79 26/03/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
80 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
81 26/05/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
82 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
83 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
84 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBADP&L
85 27/01/8/PEOPLE/220/200/1.5/WATT-SF
86 27/02/30/PEOPLE/220/200/1.5/WATT-SF
87 27/03/30/PEOPLE/220/200/1.5/WATT-SF
88 27/04/70/PEOPLE/220/200/1.0/WATT-SF
89 27/05/30/PEOPLE/220/200/1.5/WATT-SF
90 27/06/30/PEOPLE/220/200/1.5/WATT-SF
91 29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
92 29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
93 29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
94 29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
95 29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
96 29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
97 31/04/1/35/10/.1//CONSTANT/80/55
98 SYSTEM - 1
99 39/1/BASE BUILDING
100 40/01/UV
101 41/01/01/03
102 42/01/.3
103 44/01
104 45/01/CBADCLG/CBADCLG///CBADHTG
105 48/01
106 40/02/SZ
107 41/02/02/02
108 42/02/.625
109 44/02/DRY-BULB/65/100
110 45/02/CBCHCLG/CBCHCLG///CBCHHTG
111 48/02/35
112 40/03/UH
113 41/03/04/04
114 42/03
115 45/03/OFF/OFF///CBADHTG
116 EQUIPMENT - 1

CONTENTS OF : E:\CB452.TM

LINE # -----
117 59/1/CARLISLE///BASE BUILDING
118 60/01/1/BLKPLANT/01/02
119 62/01/EQ1122L/1/85/TONS
120 63/01/7.5/HP
121 65/01/1//01/03
122 67/01/EQ2001/1/7.5/HP/1805/MBH
123 69/01/EQ4372
124 69/02/EQ4003
125 69/03
126 LOAD - 2
127 19/2/WALL & ROOF INSULATION
128 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
129 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
130 20/03/01/ASSEMBLY/2063/1/3/2/2
131 20/04/02/NAVE/4935/1/3/0/0/25
132 20/05/03/CLASS RM/1310/1/3/2/2
133 20/06/03/CLASS RM/1664/1/3/2/2
134 20/07/03/VESTIBULE/128/1/3/2/2
135 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
136 21/01///CBADCTX//CBADHTX/ROOM
137 21/02///CBADCTX//CBADHTX/ROOM
138 21/03///CBADCTX//CBADHTX/ROOM
139 21/04///CBCHCTX//CBCHHTX/ROOM
140 21/05///CBADCTX//CBADHTX/ROOM
141 21/06///CBADCTX//CBADHTX/ROOM
142 21/07///CBADCTX//CBADHTX/ROOM
143 21/08///CBADHTX/ROOM
144 22/01/1/NO/130/15//191/135
145 22/02/1/NO/150/17//191/315
146 22/03/1/NO/43/22//191/45
147 22/03/2/NO/43/22//191/225
148 22/04/1/NO/103/26//112/45
149 22/04/2/NO/103/26//112/225
150 22/05/1/NO/86/21//191/45
151 22/06/1/NO/106/21//191/225
152 22/07/1/NO/18/5.5//191/45
153 22/07/2/NO/18/5.5//191/225
154 22/08/1/YES///144
155 24/01/1/168/1/1/113/45
156 24/01/2/1365/1/1/113/135
157 24/02/1/168/1/1/113/45
158 24/02/2/1610/1/1/113/315
159 24/03/1/559/1/1/113/45
160 24/03/2/520/1/1/113/135
161 24/03/3/559/1/1/113/225
162 24/04/1/1430/1/1/113/45
163 24/04/2/1056/1/1/113/135
164 24/04/3/2040/1/1/113/225
165 24/04/4/705/1/1/113/315
166 24/05/1/860/1/1/113/45
167 24/05/2/170/1/1/113/315
168 24/06/1/150/1/1/113/135
169 24/06/2/1060/1/1/113/225
170 24/06/3/170/1/1/113/315
171 24/07/1/120/1/1/113/45
172 24/07/2/120/1/1/113/225
173 24/08/1/810/1/1/113/45
174 24/08/2/170/1/1/113/135.

CONTENTS OF : E:\CB452.TM

LINE # -----
175 24/08/3/540/1/1/113/225
176 24/08/4/480/1/1/113/315
177 25/01/2///25/.56/.82
178 25/02/2///25/.56/.82
179 25/03/1///20/.56/.82
180 25/03/2///20/.56/.82
181 25/03/3///20/.56/.82
182 25/04/1///40/.56/.82
183 25/04/2///28/.56/.82
184 25/04/3///45/.56/.82
185 25/04/4///28/.56/.82
186 25/05/1///20/.56/.82
187 25/05/2///5/.56/.82
188 25/06/1///5/.56/.82
189 25/06/2///20/.56/.82
190 25/07/1///80/.56/.82
191 25/07/2///80/.56/.82
192 26/01/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
193 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
194 26/03/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
195 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
196 26/05/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
197 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
198 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
199 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBADP&L
200 27/01/8/PEOPLE/220/200/1.5/WATT-SF
201 27/02/30/PEOPLE/220/200/1.5/WATT-SF
202 27/03/30/PEOPLE/220/200/1.5/WATT-SF
203 27/04/70/PEOPLE/220/200/1.0/WATT-SF
204 27/05/30/PEOPLE/220/200/1.5/WATT-SF
205 27/06/30/PEOPLE/220/200/1.5/WATT-SF
206 29/01/10/PCT-MCLG/10/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
207 29/02/10/PCT-MCLG/10/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
208 29/03/15/PCT-MCLG/15/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
209 29/04/20/PCT-MCLG/20/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
210 29/05/10/PCT-MCLG/10/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
211 29/07/0/PCT-MCLG/0/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
212 31/04/1/35/10/.1//CONSTANT/80/55
213 SYSTEM - 2
214 39/2/WALL & ROOF INSULATION
215 40/01/UV
216 41/01/01/03
217 42/01/.3
218 44/01
219 45/01/CBADCLG/CBADCLG///CBADHTG
220 48/01
221 40/02/SZ
222 41/02/02/02
223 42/02/.625
224 44/02/DRY-BULB/65/100
225 45/02/CBCHCLG/CBCHCLG///CBCHHTG
226 48/02/35
227 40/03/UH
228 41/03/04/04
229 42/03
230 45/03/OFF/OFF///CBADHTG
231 EQUIPMENT - 2
232 59/2/CARLISLE///WALL & ROOF INSULATION

CONTENTS OF : E:\CB452.TM

LINE # -----
233 60/01/1/BLKPLANT/01/02
234 62/01/EQ1122L/1/85/TONS
235 63/01/7.5/HP
236 65/01/1//01/03
237 67/01/EQ2001/1/7.5/HP/1805/MBH
238 69/01/EQ4372
239 69/02/FQ4003
240 69/03
241 LOAD - 3
242 19/3/WEATHERSTRIP & CAULKING
243 20/01/01/CHAPLTN-CLASS RM/1700/1/3/2/2
244 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
245 20/03/01/ASSEMBLY/2063/1/3/2/2
246 20/04/02/NAVE/4935/1/3/0/0/25
247 20/05/03/CLASS RM/1310/1/3/2/2
248 20/06/03/CLASS RM/1664/1/3/2/2
249 20/07/03/VESTIBULE/128/1/3/2/2
250 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
251 21/01///CBADCTX///CBADHTX/ROOM
252 21/02///CBADCTX///CBADHTX/ROOM
253 21/03///CBADCTX///CBADHTX/ROOM
254 21/04///CBCHCTX///CBCHHTX/ROOM
255 21/05///CBADCTX///CBADHTX/ROOM
256 21/06///CBADCTX///CBADHTX/ROOM
257 21/07///CBADCTX///CBADHTX/ROOM
258 21/08///CBADHTX/ROOM
259 22/01/1/NO/130/15//154/135
260 22/02/1/NO/150/17//154/315
261 22/03/1/NO/43/22//154/45
262 22/03/2/NO/43/22//154/225
263 22/04/1/NO/103/26//111/45
264 22/04/2/NO/103/26//111/225
265 22/05/1/NO/86/21//154/45
266 22/06/1/NO/106/21//154/225
267 22/07/1/NO/18/5.5//154/45
268 22/07/2/NO/18/5.5//154/225
269 22/08/1/YES///146
270 24/01/1/168/1/1/114/45
271 24/01/2/1365/1/1/114/135
272 24/02/1/168/1/1/114/45
273 24/02/2/1610/1/1/114/315
274 24/03/1/559/1/1/114/45
275 24/03/2/520/1/1/114/135
276 24/03/3/559/1/1/114/225
277 24/04/1/1430/1/1/114/45
278 24/04/2/1056/1/1/114/135
279 24/04/3/2040/1/1/114/225
280 24/04/4/705/1/1/114/315
281 24/05/1/860/1/1/114/45
282 24/05/2/170/1/1/114/315
283 24/06/1/150/1/1/114/135
284 24/06/2/1060/1/1/114/225
285 24/06/3/170/1/1/114/315
286 24/07/1/120/1/1/114/45
287 24/07/2/120/1/1/114/225
288 24/08/1/810/1/1/114/45
289 24/08/2/170/1/1/114/135
290 24/08/3/540/1/1/114/225.

CONTENTS OF : E:\CB452.TM

LINE # -----
291 24/08/4/480/1/1/114/315
292 25/01/2///25/.56/.82
293 25/02/2///25/.56/.82
294 25/03/1///20/.56/.82
295 25/03/2///20/.56/.82
296 25/03/3///20/.56/.82
297 25/04/1///40/.56/.82
298 25/04/2///28/.56/.82
299 25/04/3///45/.56/.82
300 25/04/4///28/.56/.82
301 25/05/1///20/.56/.82
302 25/05/2///5/.56/.82
303 25/06/1///5/.56/.82
304 25/06/2///20/.56/.82
305 25/07/1///80/.56/.82
306 25/07/2///80/.56/.82
307 26/01/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
308 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
309 26/03/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
310 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
311 26/05/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
312 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
313 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
314 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBADP&L
315 27/01/8/PEOPLE/220/200/1.5/WATT-SF
316 27/02/30/PEOPLE/220/200/1.5/WATT-SF
317 27/03/30/PEOPLE/220/200/1.5/WATT-SF
318 27/04/70/PEOPLE/220/200/1.0/WATT-SF
319 27/05/30/PEOPLE/220/200/1.5/WATT-SF
320 27/06/30/PEOPLE/220/200/1.5/WATT-SF
321 29/01/10/PCT-MCLG/10/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
322 29/02/10/PCT-MCLG/10/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
323 29/03/15/PCT-MCLG/15/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
324 29/04/20/PCT-MCLG/20/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
325 29/05/10/PCT-MCLG/10/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
326 29/07/0/PCT-MCLG/0/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
327 31/04/1/35/10/.1//CONSTANT/80/55
328 SYSTEM - 3
329 39/3/WEATHERSTRIP & CAULKING
330 40/01/UV
331 41/01/01/03
332 42/01/.3
333 44/01
334 45/01/CBADCLG/CBADCLG///CBADHTG
335 48/01
336 40/02/SZ
337 41/02/02/02
338 42/02/.625
339 44/02/DRY-BULB/65/100
340 45/02/CBCHCLG/CBCHCLG///CBCHHTG
341 48/02/35
342 40/03/UH
343 41/03/04/04
344 42/03
345 45/03/OFF/OFF///CBADHTG
346 EQUIPMENT - 3
347 59/3/CARLISLE///WEATHERSTRIP & CAULKING
348 60/01/1/BLKPLANT/01/02 .

CONTENTS OF : E:\CB452.TM

LINE # -----
349 62/01/EQ1122L/1/85/TONS
350 63/01/7.5/HP
351 65/01/1//01/03
352 67/01/EQ2001/1/7.5/HP/1805/MBH
353 69/01/EQ4372
354 69/02/EQ4003
355 69/03
356 LOAD - 4
357 19/4/REPLACE FLUORESCENT LAMPS
358 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
359 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
360 20/03/01/ASSEMBLY/2063/1/3/2/2
361 20/04/02/NAVE/4935/1/3/0/0/25
362 20/05/03/CLASS RM/1310/1/3/2/2
363 20/06/03/CLASS RM/1664/1/3/2/2
364 20/07/03/VESTIBULE/128/1/3/2/2
365 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
366 21/01////CBADCTX//CBADHTX/ROOM
367 21/02////CBADCTX//CBADHTX/ROOM
368 21/03////CBADCTX//CBADHTX/ROOM
369 21/04////CBCCHCTX//CBCCHHTX/ROOM
370 21/05////CBADCTX//CBADHTX/ROOM
371 21/06////CBADCTX//CBADHTX/ROOM
372 21/07////CBADCTX//CBADHTX/ROOM
373 21/08////////CBADHTX/ROOM
374 22/01/1/N0/130/15//154/135
375 22/02/1/N0/150/17//154/315
376 22/03/1/N0/43/22//154/45
377 22/03/2/N0/43/22//154/225
378 22/04/1/N0/103/26//111/45
379 22/04/2/N0/103/26//111/225
380 22/05/1/N0/86/21//154/45
381 22/06/1/N0/106/21//154/225
382 22/07/1/N0/18/5.5//154/45
383 22/07/2/N0/18/5.5//154/225
384 22/08/1/YES///146
385 24/01/1/168/1/1/114/45
386 24/01/2/1365/1/1/114/135
387 24/02/1/168/1/1/114/45
388 24/02/2/1610/1/1/114/315
389 24/03/1/559/1/1/114/45
390 24/03/2/520/1/1/114/135
391 24/03/3/559/1/1/114/225
392 24/04/1/1430/1/1/114/45
393 24/04/2/1056/1/1/114/135
394 24/04/3/2040/1/1/114/225
395 24/04/4/705/1/1/114/315
396 24/05/1/860/1/1/114/45
397 24/05/2/170/1/1/114/315
398 24/06/1/150/1/1/114/135
399 24/06/2/1060/1/1/114/225
400 24/06/3/170/1/1/114/315
401 24/07/1/120/1/1/114/45
402 24/07/2/120/1/1/114/225
403 24/08/1/810/1/1/114/45
404 24/08/2/170/1/1/114/135
405 24/08/3/540/1/1/114/225
406 24/08/4/480/1/1/114/315.

CONTENTS OF : E:\CB452.TM

LINE # -----
407 25/01/2///25/.56/.82
408 25/02/2///25/.56/.82
409 25/03/1///20/.56/.82
410 25/03/2///20/.56/.82
411 25/03/3///20/.56/.82
412 25/04/1///40/.56/.82
413 25/04/2///28/.56/.82
414 25/04/3///45/.56/.82
415 25/04/4///28/.56/.82
416 25/05/1///20/.56/.82
417 25/05/2///5/.56/.82
418 25/06/1///5/.56/.82
419 25/06/2///20/.56/.82
420 25/07/1///80/.56/.82
421 25/07/2///80/.56/.82
422 26/01/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
423 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
424 26/03/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
425 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
426 26/05/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
427 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
428 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
429 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBADP&L
430 27/01/8/PEOPLE/220/200/1.4/WATT-SF
431 27/02/30/PEOPLE/220/200/1.4/WATT-SF
432 27/03/30/PEOPLE/220/200/1.4/WATT-SF
433 27/04/70/PEOPLE/220/200/1.0/WATT-SF
434 27/05/30/PEOPLE/220/200/1.4/WATT-SF
435 27/06/30/PEOPLE/220/200/1.4/WATT-SF
436 29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
437 29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
438 29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
439 29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
440 29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
441 29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
442 31/04/1/35/10/.1//CONSTANT/80/55
443 SYSTEM - 4
444 39/4/REPLACE FLUORESCENT LAMPS
445 40/01/UV
446 41/01/01/03
447 42/01/.3
448 44/01
449 45/01/CBADCLG/CBADCLG///CBADHTG
450 48/01
451 40/02/SZ
452 41/02/02/02
453 42/02/.625
454 44/02/DRY-BULB/65/100
455 45/02/CBCHCLG/CBCHCLG///CBCHHTG
456 48/02/35
457 40/03/UH
458 41/03/04/04
459 42/03
460 45/03/OFF/OFF///CBADHTG
461 EQUIPMENT - 4
462 59/4/CARLISLE///REPLACE FLUORESCENT LAMPS
463 60/01/1/BLKPLANT/01/02
464 62/01/EQ1122L/1/85/TONS

CONTENTS OF : E:\CB452.TM

LINE #	
465	63/01/7.5/HP
466	65/01/1//01/03
467	67/01/EQ2001/1/7.5/HP/1805/MBH
468	69/01/EQ4372
469	69/02/EQ4003
470	69/03

CONTENTS OF : E:\CB452B.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 452
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1.
12 19/1/REPLACE FLUORESCENT BALLASTS
13 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
14 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
15 20/03/01/ASSEMBLY/2063/1/3/2/2
16 20/04/02/NAVE/4935/1/3/0/0/25
17 20/05/03/CLASS RM/1310/1/3/2/2
18 20/06/03/CLASS RM/1664/1/3/2/2
19 20/07/03/VESTIBULE/128/1/3/2/2
20 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
21 21/01///CBADCTX//CBADHTX/ROOM
22 21/02///CBADCTX//CBADHTX/ROOM
23 21/03///CBADCTX//CBADHTX/ROOM
24 21/04///CBCHCTX//CBCHHTX/ROOM
25 21/05///CBADCTX//CBADHTX/ROOM
26 21/06///CBADCTX//CBADHTX/ROOM
27 21/07///CBADCTX//CBADHTX/ROOM
28 21/08////////CBADHTX/ROOM
29 22/01/1/N0/130/15//154/135
30 22/02/1/N0/150/17//154/315
31 22/03/1/N0/43/22//154/45
32 22/03/2/N0/43/22//154/225
33 22/04/1/N0/103/26//111/45
34 22/04/2/N0/103/26//111/225
35 22/05/1/N0/86/21//154/45
36 22/06/1/N0/106/21//154/225
37 22/07/1/N0/18/5.5//154/45
38 22/07/2/N0/18/5.5//154/225
39 22/08/1/YES///146
40 24/01/1/168/1/1/114/45
41 24/01/2/1365/1/1/114/135
42 24/02/1/168/1/1/114/45
43 24/02/2/1610/1/1/114/315
44 24/03/1/559/1/1/114/45
45 24/03/2/520/1/1/114/135
46 24/03/3/559/1/1/114/225
47 24/04/1/1430/1/1/114/45
48 24/04/2/1056/1/1/114/135
49 24/04/3/2040/1/1/114/225
50 24/04/4/705/1/1/114/315
51 24/05/1/860/1/1/114/45
52 24/05/2/170/1/1/114/315
53 24/06/1/150/1/1/114/135
54 24/06/2/1060/1/1/114/225
55 24/06/3/170/1/1/114/315
56 24/07/1/120/1/1/114/45
57 24/07/2/120/1/1/114/225
58 24/08/1/810/1/1/114/45

CONTENTS OF : E:\CB452B.TM

LINE # -----
59 24/08/2/170/1/1/114/135
60 24/08/3/540/1/1/114/225
61 24/08/4/480/1/1/114/315
62 25/01/2///25/.56/.82
63 25/02/2///25/.56/.82
64 25/03/1///20/.56/.82
65 25/03/2///20/.56/.82
66 25/03/3///20/.56/.82
67 25/04/1///40/.56/.82
68 25/04/2///28/.56/.82
69 25/04/3///45/.56/.82
70 25/04/4///28/.56/.82
71 25/05/1///20/.56/.82
72 25/05/2///5/.56/.82
73 25/06/1///5/.56/.82
74 25/06/2///20/.56/.82
75 25/07/1///80/.56/.82
76 25/07/2///80/.56/.82
77 26/01/CRADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
78 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
79 26/03/CRADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
80 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
81 26/05/CRADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
82 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
83 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
84 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBADP&L
85 27/01/8/PEOPLE/220/200/1.25/WATT-SF
86 27/02/30/PEOPLE/220/200/1.25/WATT-SF
87 27/03/30/PEOPLE/220/200/1.25/WATT-SF
88 27/04/70/PEOPLE/220/200/1.0/WATT-SF
89 27/05/30/PEOPLE/220/200/1.25/WATT-SF
90 27/06/30/PEOPLE/220/200/1.25/WATT-SF
91 29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
92 29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
93 29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
94 29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
95 29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
96 29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
97 31/04/1/35/10/.1//CONSTANT/80/55
98 SYSTEM - 1
99 39/1/REPLACE FLUORESCENT BALLASTS
100 40/01/UV
101 41/01/01/03
102 42/01/.3
103 44/01
104 45/01/CBADCLG/CBADCLG///CBADHTG
105 48/01
106 40/02/SZ
107 41/02/02/02
108 42/02/.625
109 44/02/DRY-BULB/65/100
110 45/02/CBCHCLG/CBCHCLG///CBCHHTG
111 48/02/35
112 40/03/UH
113 41/03/04/04
114 42/03
115 45/03/OFF/OFF///CBADHTG
116 EQUIPMENT - 1

CONTENTS OF : E:\CB452B.TM

LINE # -----
117 59/1/CARLISLE///REPLACE FLUORESCENT BALLASTS
118 60/01/1/BLKPLANT/01/02
119 62/01/EQ1122L/1/85/TONS
120 63/01/7.5/HP
121 65/01/1//01/03
122 67/01/EQ2001/1/7.5/HP/1805/MBH
123 69/01/EQ4372
124 69/02/EQ4003
125 69/03
126 LOAD - 2
127 19/2/REPLACE FLUORESCENT FIXTURES
128 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
129 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
130 20/03/01/ASSEMBLY/2063/1/3/2/2
131 20/04/02/NAVE/4935/1/3/0/0/25
132 20/05/03/CLASS RM/1310/1/3/2/2
133 20/06/03/CLASS RM/1664/1/3/2/2
134 20/07/03/VESTIBULE/128/1/3/2/2
135 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
136 21/01////CBADCTX///CBADHTX/ROOM
137 21/02////CBADCTX///CBADHTX/ROOM
138 21/03////CBADCTX///CBADHTX/ROOM
139 21/04////CBCHCTX///CBCHHTX/ROOM
140 21/05////CBADCTX///CBADHTX/ROOM
141 21/06////CBADCTX///CBADHTX/ROOM
142 21/07////CBADCTX///CBADHTX/ROOM
143 21/08////CBADHTX/ROOM
144 22/01/1/NO/130/15//154/135
145 22/02/1/NO/150/17//154/315
146 22/03/1/NO/43/22//154/45
147 22/03/2/NO/43/22//154/225
148 22/04/1/NO/103/26//111/45
149 22/04/2/NO/103/26//111/225
150 22/05/1/NO/86/21//154/45
151 22/06/1/NO/106/21//154/225
152 22/07/1/NO/18/5.5//154/45
153 22/07/2/NO/18/5.5//154/225
154 22/08/1/YES////146
155 24/01/1/168/1/1/114/45
156 24/01/2/1365/1/1/114/135
157 24/02/1/168/1/1/114/45
158 24/02/2/1610/1/1/114/315
159 24/03/1/559/1/1/114/45
160 24/03/2/520/1/1/114/135
161 24/03/3/559/1/1/114/225
162 24/04/1/1430/1/1/114/45
163 24/04/2/1056/1/1/114/135
164 24/04/3/2040/1/1/114/225
165 24/04/4/705/1/1/114/315
166 24/05/1/860/1/1/114/45
167 24/05/2/170/1/1/114/315
168 24/06/1/150/1/1/114/135
169 24/06/2/1060/1/1/114/225
170 24/06/3/170/1/1/114/315
171 24/07/1/120/1/1/114/45
172 24/07/2/120/1/1/114/225
173 24/08/1/810/1/1/114/45
174 24/08/2/170/1/1/114/135

CONTENTS OF : E:\CB4528.TM

LINE # -----
175 24/08/3/540/1/1/114/225
176 24/08/4/480/1/1/114/315
177 25/01/2///25/.56/.82
178 25/02/2///25/.56/.82
179 25/03/1///20/.56/.82
180 25/03/2///20/.56/.82
181 25/03/3///20/.56/.82
182 25/04/1///40/.56/.82
183 25/04/2///28/.56/.82
184 25/04/3///45/.56/.82
185 25/04/4///28/.56/.82
186 25/05/1///20/.56/.82
187 25/05/2///5/.56/.82
188 25/06/1///5/.56/.82
189 25/06/2///20/.56/.82
190 25/07/1///80/.56/.82
191 25/07/2///80/.56/.82
192 26/01/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
193 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
194 26/03/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
195 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
196 26/05/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
197 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
198 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
199 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBADP&L
200 27/01/8/PEOPLE/220/200/1.14/WATT-SF
201 27/02/30/PEOPLE/220/200/1.14/WATT-SF
202 27/03/30/PEOPLE/220/200/1.14/WATT-SF
203 27/04/70/PEOPLE/220/200/1.0/WATT-SF
204 27/05/30/PEOPLE/220/200/1.14/WATT-SF
205 27/06/30/PEOPLE/220/200/1.14/WATT-SF
206 29/01/1.0/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
207 29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
208 29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
209 29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
210 29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
211 29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
212 31/04/1/35/10/.1//CONSTANT/80/55
213 SYSTEM - 2
214 39/2/REPLACE FLUORESCENT FIXTURES
215 40/01/UV
216 41/01/01/03
217 42/01/.3
218 44/01
219 45/01/CBADCLG/CBADCLG///CBADHTG
220 48/01
221 40/02/SZ
222 41/02/02/02
223 42/02/.625
224 44/02/DRY-BULB/65/100
225 45/02/CBCHCLG/CBCHCLG///CBCHHTG
226 48/02/35
227 40/03/UH
228 41/03/04/04
229 42/03
230 45/03/OFF/OFF///CBADHTG
231 EQUIPMENT - 2
232 59/2/CARLISLE///REPLACE FLUORESCENT FIXTURES

CONTENTS OF : E:\CB452B.TM

LINE # -----
233 60/01/1/BLKPLANT/01/02
234 62/01/EQ1122L/1/85/TONS
235 63/01/7.5/HP
236 65/01/1//01/03
237 67/01/EQ2001/1/7.5/HP/1805/MBH
238 69/01/EQ4372
239 69/02/EQ4003
240 69/03
241 LOAD - 3
242 19/3/COMBINED ECOS
243 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
244 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
245 20/03/01/ASSEMBLY/2063/1/3/2/2
246 20/04/02/NAVE/4935/1/3/0/0/25
247 20/05/03/CLASS RM/1310/1/3/2/2
248 20/06/03/CLASS RM/1664/1/3/2/2
249 20/07/03/VESTIBULE/128/1/3/2/2
250 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
251 21/01///CBADCTX///CBADHTX/ROOM
252 21/02///CBADCTX///CBADHTX/ROOM
253 21/03///CBADCTX///CBADHTX/ROOM
254 21/04///CBCHCTX///CBCHHHTX/ROOM
255 21/05///CRADCTX///CBADHTX/ROOM
256 21/06///CBADCTX///CBADHTX/ROOM
257 21/07///CBADCTX///CBADHTX/ROOM
258 21/08////////CBADHTX/ROOM
259 22/01/1/N0/130/15//191/135
260 22/02/1/N0/150/17//191/315
261 22/03/1/N0/43/22//191/45
262 22/03/2/N0/43/22//191/225
263 22/04/1/N0/103/26//112/45
264 22/04/2/N0/103/26//112/225
265 22/05/1/N0/86/21//191/45
266 22/06/1/N0/106/21//191/225
267 22/07/1/N0/18/5.5//191/45
268 22/07/2/N0/18/5.5//191/225
269 22/08/1/YES///144
270 24/01/1/168/1/1/113/45
271 24/01/2/1365/1/1/113/135
272 24/02/1/168/1/1/113/45
273 24/02/2/1610/1/1/113/315
274 24/03/1/559/1/1/113/45
275 24/03/2/520/1/1/113/135
276 24/03/3/559/1/1/113/225
277 24/04/1/1430/1/1/113/45
278 24/04/2/1056/1/1/113/135
279 24/04/3/2040/1/1/113/225
280 24/04/4/705/1/1/113/315
281 24/05/1/860/1/1/113/45
282 24/05/2/170/1/1/113/315
283 24/06/1/150/1/1/113/135
284 24/06/2/1060/1/1/113/225
285 24/06/3/170/1/1/113/315
286 24/07/1/120/1/1/113/45
287 24/07/2/120/1/1/113/225
288 24/08/1/810/1/1/113/45
289 24/08/2/170/1/1/113/135
290 24/08/3/540/1/1/113/225

CONTENTS OF : E:\CB452B.TM

LINE # -----
291 24/08/4/480/1/1/113/315
292 25/01/2///25/.56/.82
293 25/02/2///25/.56/.82
294 25/03/1///20/.56/.82
295 25/03/2///20/.56/.82
296 25/03/3///20/.56/.82
297 25/04/1///40/.56/.82
298 25/04/2///28/.56/.82
299 25/04/3///45/.56/.82
300 25/04/4///28/.56/.82
301 25/05/1///20/.56/.82
302 25/05/2///5/.56/.82
303 25/06/1///5/.56/.82
304 25/06/2///20/.56/.82
305 25/07/1///80/.56/.82
306 25/07/2///80/.56/.82
307 26/01/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
308 26/02/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
309 26/03/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
310 26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
311 26/05/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
312 26/06/CBADP&L/CBADP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBADP&L
313 26/07/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
314 26/08/OFF/CBADP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAOP&L
315 27/01/8/PEOPLE/220/200/1.14/WATT-SF
316 27/02/30/PEOPLE/220/200/1.14/WATT-SF
317 27/03/30/PEOPLE/220/200/1.14/WATT-SF
318 27/04/70/PEOPLE/220/200/1.0/WATT-SF
319 27/05/30/PEOPLE/220/200/1.14/WATT-SF
320 27/06/30/PEOPLE/220/200/1.14/WATT-SF
321 29/01/10/PCT-MCLG/10/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
322 29/02/10/PCT-MCLG/10/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
323 29/03/15/PCT-MCLG/15/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
324 29/04/20/PCT-MCLG/20/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
325 29/05/10/PCT-MCLG/10/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
326 29/07/0/PCT-MCLG/0/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
327 31/04/1/35/10/.1//CONSTANT/80/55
328 SYSTEM - 3
329 39/3/COMBINED ECOS
330 40/01/UV
331 41/01/01/03
332 42/01/.3
333 44/01
334 45/01/CBADCLG/CBADCLG///CBADHTG
335 48/01
336 40/02/SZ
337 41/02/02/02
338 42/02/.625
339 44/02/DRY-BULB/65/100
340 45/02/CBCHCLG/CBCHCLG///CBCHHTG
341 48/02/35
342 40/03/UH
343 41/03/04/04
344 42/03
345 45/03/OFF/OFF///CBADHTG
346 EQUIPMENT - 3
347 59/3/CARLISLE///COMBINED ECOS
348 60/01/1/BLKPLANT/01/02

CONTENTS OF : E:\CB452B.TM

LINE #	
349	62/01/EQ1122L/1/85/TONS
350	63/01/7.5/HP
351	65/01/1//01/03
352	67/01/EQ2001/1/7.5/HP/1805/MBH
353	69/01/EQ4372
354	69/02/EQ4003
355	69/03

Building 452

Trace Output File

933702

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	11:44:10 2/3/94
Dataset Name:	CB452.TM

AIRFLOW - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
1 UV		4,581	31,315	31,315	34,865	8,130	0	0
2 SZ		3,368	16,839	16,839	18,461	16,839	0	0
3 UH		0	0	2,078	0	0	0	0
Totals		7,949	48,154	50,232	53,325	24,970	0	0

CAPACITY - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

Cooling				Heating								
Main System	Sys.	Aux. Sys.	Opt. Vent	Cooling Capacity	Main System	Aux. Sys.	Preheat Capacity	Reheat Capacity	Humidif. Capacity	Opt. Capacity	Vent Capacity	Heating Totals
System Number	Type	Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
1 UV		73.4	0.0	0.0	73.4	-1,080,515	0	0	0	0	0	-1,080,515
2 SZ		29.4	0.0	0.0	29.4	-432,496	0	0	0	0	0	-432,496
3 UH		0.0	0.0	0.0	0.0	-128,877	0	0	0	0	0	-128,877
Totals		102.8	0.0	0.0	102.8	-1,641,887	0	0	0	0	0	-1,641,887

The building peaked at hour 16 month 7 with a capacity of 102.3 tons

ENGINEERING CHECKS - ALTERNATIVE 1
BASE BUILDING

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	UV		14.63	2.23	426.6	191.7	62.59	2.23	-76.77	14,074	
2 Main	SZ		20.00	3.41	572.0	167.6	71.58	3.41	-87.64	4,935	
3 Main	UH		0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593	

System 1 Block UV - UNIT VENTILATOR

--COOLING COIL SELECTION--

---AFEAS

--HEATING COIL SELECTION--

HEATING COIL SELECTION				WIRING (ft ²)			ENGINEERING CHECKS			TEMPERATURES (F)		
	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type Vent	Cooling 4,581	Heating 0	Clg % OA Clg Cfm/Sqft	14.6 2.23	Type SADB	Clg 58.5	Htg 95.1
Main Htg	-1,080.5	31,315	63.4	95.1	Infil	3,550	3,550	Clg Cfm/Ton	426.60	Plenum	78.7	59.0
Aux Htg	0.0	0	0.0	0.0	Supply	31,315	31,315	Clg Sqft/Ton	191.73	Return	78.7	63.7
Preheat	-0.0	31,315	62.0	58.3	Mincfm	0	0	Clg BtuH/Sqft	62.59	Ret/OA	80.5	63.7
Reheat	0.0	0	0.0	0.0	Return	31,315	31,315	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	4,581	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	2.23	Fn BldTD	0.0	0.0
Total	-1,080.5				Auxil	0	0	Htg BtuH/SqFt	-76.77	Fn Frict	0.1	0.0

-----ATRELROWS (cfa)-----

--ENGINEERING CHECKS--

--TEMPERATURES (F)--

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 7/12						*	Mo/Hr: 7/17			Mo/Hr: 13/ 1		
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0						*	OADB: 89	*	OADB: 4			
						*			*			
Envelope Loads	Space Sens. + Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0		30,496	8.63	*	44,331	16.20	*	-38,497	-38,497	8.90
Glass Solar	75,357	0		75,357	21.33	*	117,002	42.76	*	0	0	0.00
Glass Cond	10,550	0		10,550	2.99	*	14,326	5.24	*	-72,739	-72,739	16.82
Wall Cond	42,873	0		42,873	12.14	*	72,429	26.47	*	-207,867	-207,867	48.06
Partition	175			175	0.05	*	175	0.06	*	-455	-455	0.11
Exposed Flcor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	55,749			55,749	15.78	*	25,058	9.16	*	-112,938	-112,938	26.11
Sub Total ==>	215,200	0		215,200	60.92	*	273,320	99.88	*	-432,496	-432,496	100.00
Internal Loads						*			*			
Lights	4,548	0		4,548	1.29	*	168	0.06	*	0	0	0.00
People	10,542			10,542	2.98	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total ==>	15,090	0	0	15,090	4.27	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				7,185	2.03	*		0.00	*			0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*			0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*		0.00	*			0.00
Terminal Bypass	0	0	0	0	0.00	*		0.00	*			0.00
Grand Total ==>	230,290	0	0	353,258	100.00	*	273,643	100.00	*	-432,496	-432,496	100.00

COOLING COIL SELECTION								AREAS				
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Leaving DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Gross Total Floor	Glass (sf)	(%)	
Main Clg	29.4	353.3	238.8	16,839	77.4	64.5	72.8	59.7	57.8	70.3	Part	350
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	5,356
Totals	29.4	353.3									Wall	5,231
												1,983 38

HEATING COIL SELECTION				AIRFLOWS (cfm)				ENGINEERING CHECKS		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating	Clg % OA	20.0	Type	Clg	Htg	
Main Htg	-432.5	16,839	68.0	91.6	Infil	1,622	1,622	0	Clg Cfm/Sqft	3.41	SADB	60.1 91.6
Aux Htg	0.0	0	0.0	0.0	Supply	16,839	16,839	0	Clg Cfm/Ton	572.02	Plenum	75.0 68.0
Preheat	-0.0	16,839	68.0	59.7	Mincfm	0	0	0	Clg Sqft/Ton	167.64	Return	75.0 68.0
Reheat	0.0	0	0.0	0.0	Return	16,839	16,839	No. People	Clg Btuh/Sqft	71.58	Ret/OA	77.4 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,368	0	70	Htg % OA	0.0	Runarnd	75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0	Htg Cfm/SqFt	3.41	Fn MtrTD	0.1 0.0
Total	-432.5				Auxil	0	0	0	Htg Btuh/SqFt	-87.64	Fn BldTD	0.1 0.0
									Htg Frict	0.2	Fn Frict	0.2 0.0

BUILDING U-VALUES - ALTERNATIVE 1
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)						Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)	
			Summr ExFlr	Wintr Skylt	Summr Skylt	Wintr Roof	Summr Windo	Wintr Windo	Wall	Ceil.	
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2 17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9 16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4 16.14
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1 16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3 17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5 18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7 13.66
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3 17.69
System	1 Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3 16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6 13.89
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6 13.89
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6 13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5 16.46

BUILDING AREAS - ALTERNATIVE 1
BASE BUILDING

----- B U I L D I N G A R E A S -----

Room Number	Description	Floor Flr	Number of Duplicate Rm	Area/Dupl (sqft)	Floor Area (sqft)	Total Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
BASE BUILDING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	5.1	18	144	-82,094	48	1,250	2,511.6	53	3,372	0.0	0	0
5 - 10	10.3	29	240	-164,189	10	255	5,023.2	0	0	0.0	0	0
10 - 15	15.4	17	137	-246,283	5	133	7,534.8	0	0	0.0	0	0
15 - 20	20.6	6	51	-328,377	5	137	10,046.4	14	856	0.0	0	0
20 - 25	25.7	11	86	-410,472	1	26	12,558.0	18	1,160	0.0	0	0
25 - 30	30.9	5	38	-492,566	1	14	15,069.6	0	0	0.0	0	0
30 - 35	36.0	0	0	-574,661	15	379	17,581.2	0	0	0.0	0	0
35 - 40	41.1	0	0	-656,755	1	33	20,092.8	0	0	0.0	0	0
40 - 45	46.3	5	37	-738,849	0	0	22,604.4	0	0	0.0	0	0
45 - 50	51.4	0	0	-820,944	0	0	25,116.1	0	0	0.0	0	0
50 - 55	56.6	0	0	-903,038	2	47	27,627.7	0	0	0.0	0	0
55 - 60	61.7	1	8	-985,133	6	154	30,139.3	0	0	0.0	0	0
60 - 65	66.8	5	37	-1,067,227	2	42	32,650.9	0	0	0.0	0	0
65 - 70	72.0	5	40	-1,149,321	1	21	35,162.5	3	168	0.0	0	0
70 - 75	77.1	0	0	-1,231,416	0	4	37,674.1	4	266	0.0	0	0
75 - 80	82.3	0	0	-1,313,510	2	50	40,185.7	0	0	0.0	0	0
80 - 85	87.4	0	0	-1,395,605	1	37	42,697.3	0	0	0.0	0	0
85 - 90	92.6	0	0	-1,477,699	1	20	45,203.9	8	504	0.0	0	0
90 - 95	97.7	0	0	-1,559,793	0	0	47,720.5	0	0	0.0	0	0
95 - 100	102.8	0	0	-1,641,888	0	0	50,232.1	0	0	0.0	0	0
Hours Off	0.0	0	7,942	0	0	6,158	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	3	2	4	Zone Number
Max. Temp.	89.0	97.8	99.5	98.0	91.3	
Mo./Hr.	7 24	7 23	7 24	7 23	7 24	
Day Type	4	1	1	1	1	
						Number of Hours
Above 100	0	0	0	0	0	
95 - 100	0	45	417	45	0	
90 - 95	0	479	1,147	390	90	
85 - 90	363	1,059	743	1,058	971	
80 - 85	1,338	1,278	882	1,230	1,243	
75 - 80	1,879	731	529	853	1,013	
70 - 75	241	229	357	225	355	
65 - 70	1,988	1,419	514	1,425	1,963	
60 - 65	1,197	956	932	954	1,334	
55 - 60	538	559	529	572	752	
50 - 55	462	892	789	875	1,039	
Below 50	754	1,113	1,916	1,113	0	
Min. Temp.	36.6	38.4	36.6	38.5	54.9	
Mo./Hr.	2 7	2 12	2 12	2 11	1 7	
Day Type	5	3	4	3	3	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Therm)	GAS DMND On Peak (Thrm/hr)
Jan	8,726	37	2,082	17
Feb	7,941	37	1,874	17
March	7,622	37	1,408	17
April	6,222	37	448	11
May	5,558	56	0	0
June	10,342	107	0	0
July	13,213	116	0	0
Aug	10,470	106	0	0
Sept	4,855	81	0	0
Oct	6,583	37	451	11
Nov	7,170	37	1,220	14
Dec	8,043	37	1,826	17
Total	96,746	116	9,308	17

Building Energy Consumption = 55,792 (Btu/Sq Ft/Year) Floor Area = 22,602 (Sq Ft)
Source Energy Consumption = 87,182 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1

BASE BUILDING

ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1 EQ2001	GAS FIRE TUBE HOT WATER												
GAS	2082	1874	1408	448	0	0	0	0	0	451	1220	1826	9,308
PK	17.1	17.1	16.5	11.1	0.0	0.0	0.0	0.0	0.0	11.1	13.6	17.1	17.1
1 EQ5020	HEAT WATER CIRC. PUMP C.V.												
ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	747	695	523	343	0	0	0	0	0	341	469	655	3,774
PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307	BOILER CONTROLS												
ELEC	207	192	145	95	0	0	0	0	0	94	130	182	1,046
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 115.9 (kW)
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ11221	AIR-OLD RECIP >55 TONS	90.2	77.83
Sub Total			90.2	77.83
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.7	8.35
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.3	3.73
Sub Total			14.0	12.08
Sub Total			0.0	0.00

Miscellaneous

Lights	11.7	10.09
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	11.7	10.09
Grand Total	115.9	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:15:26 2/3/94
Dataset Name: CB452.TM

AIRFLOW - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 UV		4,113	28,144	28,144	31,236	7,204	0	0
2 SZ		3,081	15,404	15,404	16,816	15,404	0	0
3 UH		0	0	2,023	0	0	0	0
Totals		7,193	43,548	45,572	48,052	22,608	0	0

CAPACITY - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating								
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent Capacity (Btuh)	Heating Totals (Btuh)
1 UV		66.6	0.0	0.0	66.6	-1,005,478	0	0	0	0	0	0	0	-1,005,478
2 SZ		28.2	0.0	0.0	28.2	-407,437	0	0	0	0	0	0	0	-407,437
3 UH		0.0	0.0	0.0	0.0	-125,512	0	0	0	0	0	0	0	-125,512
Totals		94.8	0.0	0.0	94.8	-1,538,428	0	0	0	0	0	0	0	-1,538,428

The building peaked at hour 16 month 7 with a capacity of 93.5 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	UV		14.61	2.00	422.5	211.3	56.80	2.00	-71.44			14,074
2 Main	SZ		20.00	3.12	546.6	175.1	68.53	3.12	-82.56			4,935
3 Main	UH		0.00	0.00	0.0	0.0	0.00	0.56	-34.93			3,593

System 1 Block UV - UNIT VENTILATOR

COOLING COIL PEAK					CLG SPACE PEAK					HEATING COIL PEAK				
Peaked at Time ==>		Mo/Hr: 7/16			*		Mo/Hr: 7/16			*		Mo/Hr: 13/ 1		
Outside Air ==>		OADB/WB/HR: 91/ 73/ 98.0			*		OADB: 91			*		OADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)		
Envelope Loads						*			*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00		
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00		
Roof Cond	33,525	19,798		53,323	6.67	*	32,475	6.22	*	-28,011	-43,858	4.53		
Glass Solar	194,327	0		194,827	24.37	*	207,644	39.80	*	0	0	0.00		
Glass Cond	27,782	0		27,782	3.48	*	26,528	5.08	*	-133,751	-133,751	13.80		
Wall Cond	140,644	24,330		164,974	20.64	*	139,790	26.79	*	-490,481	-575,591	59.40		
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.05		
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00		
Infiltration	118,730			118,730	14.85	*	49,380	9.46	*	-215,310	-215,310	22.22		
Sub Total==>	515,683	44,128		559,811	70.03	*	455,992	87.40	*	-868,008	-968,965	100.00		
Internal Loads						*			*					
Lights	36,613	0		36,613	4.58	*	36,177	6.93	*	0	0	0.00		
People	49,413			49,413	6.18	*	23,518	4.51	*	0	0	0.00		
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00		
Sub Total==>	86,025	0	0	86,025	10.76	*	59,695	11.44	*	0	0	0.00		
Ceiling Load	6,331	-6,331		0	0.00	*	6,036	1.16	*	-10,932	0	0.00		
Outside Air	0	0	0	157,948	19.76	*	0	0.00	*	0	0	0.00		
Sup. Fan Heat				6,004	0.75	*		0.00	*		0	0.00		
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00		
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00		
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00		
Exhaust Heat	-10,449	0	-10,449	-1.31	*		0.00	*		0	0	0.00		
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00		
Grand Total==>	608,040	27,348	0	799,340	100.00	*	521,724	100.00	*	-878,939	-968,965	100.00		

--COOLING COIL SELECTION--

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total Floor	Glass (sf) (%)
Main Clg	66.6	799.3	618.6	28,144	79.3	64.9	71.1	57.9	55.6	63.9	Part 350
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof 15,978 0 0
Totals	66.6	799.3								Wall 12,830	3,646 28

----- AREAS

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil (cfm)	Airfl Deg F	Ent Deg F	Lvg Vent	Type	Cooling 4,113	Heating 0	Clg % OA Clg Cfm/Sqft	14.6 2.00	Type SADB	Clg 58.0	Htg 96.7
Main Htg	-1,005.5	28,144	63.9	96.7	Infil		3,091	3,091	Clg Cfm/Ton	422.51	Plenum	77.3	60.0
Aux Htg	0.0	0	0.0	0.0	Supply		28,144	28,144	Clg Sqft/Ton	211.28	Return	77.3	64.2
Preheat	-0.0	28,144	61.9	57.8	Mincfm		0	0	Clg Btuh/Sqft	56.80	Ret/OA	79.3	64.2
Reheat	0.0	0	0.0	0.0	Return		28,144	28,144	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust		4,113	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh		0	0	Htg Cfm/Sqft	2.00	Fn BldTD	0.0	0.0
Total	-1,005.5				Auxil		0	0	Htg Btuh/SqFt	-71.44	Fn Frict	0.1	0.0

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/12 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 * OADB: 89 * OADB: 4
 * *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	21,096	0		21,096	6.24	*	32,475	13.07	*	-28,011	-28,011	6.87
Glass Solar	75,357	0		75,357	22.28	*	117,002	47.09	*	0	0	0.00
Glass Cond	10,550	0		10,550	3.12	*	14,326	5.77	*	-72,739	-72,739	17.85
Wall Cond	54,890	0		54,890	16.23	*	62,360	25.10	*	-207,867	-207,867	51.02
Partition	175			175	0.05	*	175	0.07	*	-455	-455	0.11
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	48,556			48,556	14.36	*	21,825	8.78	*	-98,365	-98,365	24.14
Sub Total==>	210,623	0		210,623	62.28	*	248,162	99.87	*	-407,437	-407,437	100.00
Internal Loads						*			*			
Lights	4,548	0		4,548	1.34	*	168	0.07	*	0	0	0.00
People	10,542			10,542	3.12	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.46	*	322	0.13	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	105,913	31.32	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,572	1.94	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	225,713	0	0	338,198	100.00	*	248,485	100.00	*	-407,437	-407,437	100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tops)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)					
Main Clg	28.2	338.2	234.4	15,404	77.4	64.5	72.8	59.8	57.5	68.8	Part	350
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	5,356
Totals	28.2	338.2									Wall	5,231
												1,983
												38

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
Main Htg	-407.4	15,404	68.0	92.3	Infil	1,412	1,412	Clg Cfm/Sqft	3.12	SADB	60.2
Aux Htg	0.0	0	0.0	0.0	Supply	15,404	15,404	Clg Cfm/Ton	546.56	Plenum	75.0
Preheat	-0.0	15,404	68.0	59.8	Mincfm	0	0	Clg Sqft/Ton	175.10	Return	68.0
Reheat	0.0	0	0.0	0.0	Return	15,404	15,404	Clg Btuh/Sqft	68.53	Ret/OA	77.4
Humidif	0.0	0	0.0	0.0	Exhaust	3,081	0	No. People	70	Runarnd	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.1
Total	-407.4				Auxil	0	0	Htg Cfm/SqFt	3.12	Fn BldTD	0.1
								Htg Btuh/SqFt	-82.56	Fn Frict	0.2
											0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS--

-----AREAS-----

-----TEMPERATURES (F)---

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==> Mo/Hr: 0/ 0						*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0						*	OADB: 0			*	OADB: 4
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak (Btuh)	Coil Peak Tot Sens (Btuh) Percent (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-6,183 4.93
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0 0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-119,329 95.07
Partition	0			0	0.00	*	0	0.00	*	0	0 0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0 0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0 0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-125,512 100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0 0.00
People	0			0	0.00	*	0	0.00	*	0	0 0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-23,112	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sup. Fan Heat				0	0.00	*			0.00		0 0.00
Ret. Fan Heat		0		0	0.00	*			0.00		0 0.00
Duct Heat Pkup		0		0	0.00	*			0.00		0 0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0 0.00
Exhaust Heat		0	0	0	0.00	*			0.00		0 0.00
Terminal Bypass		0	0	0	0.00	*			0.00		0 0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-125,512	-125,512 100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Leaving DB/WB/HR Deg F	Grains	Gross Total Floor	Glass (sf) Part	(%)	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	3,593	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	3,593	0	0
Totals	0.0	0.0						2,000	0	0	

HEATING COIL SELECTION				AIRFLOWS (cfm)				ENGINEERING CHECKS		TEMPERATURES (F)	
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-125.5	2,023	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0 125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,023	Clg Cfm/Ton	0.00	Plenum	0.0 46.3
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0 68.0
Reheat	0.0	0	0.0	0.0	Return	0	2,023	Clg Btuh/Sqft	0.00	Ret/OA	0.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Total	-125.5				Auxil	0	0	Htg Cfm/SqFt	0.56	Fn BldTD	0.0 0.0
							0	Htg Btuh/SqFt	-34.93	Fn Frict	0.0 0.0

BUILDING U-VALUES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
		(Btu/hr/sqft/F)											
		Summr ExFlr	Wintr Skylt	Summr Skylt	Roof	Windr Windo	Windr Windo	Wall	Ceil.				
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	84.0	18.30	
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.5	16.69	
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.9	16.63	
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	78.7	17.12	
4	NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28	
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28	
5	CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	82.3	18.08	
6	CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	85.6	18.75	
7	VESTIBULE	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	63.1	14.15	
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	83.2	18.28	
System	1 Total/Ave.	0.100	0.000	0.000	0.000	0.045	0.560	0.573	1.000	0.297	79.7	17.43	
4	NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28	
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28	
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28	
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07	
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07	
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07	
Building		0.100	0.000	0.000	0.000	0.052	0.560	0.573	1.000	0.297	78.4	17.18	

BUILDING AREAS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING AREAS -----

Room Number	Description	Floor Flr	Number of Duplicate Rm	Floor Area/Dupl (sqft)	Total Room Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Sk /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.052 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.420 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 3.35 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.04 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	4.7	23	211	-76,921	48	1,201	2,278.6	53	3,372	0.0	0	0
5 - 10	9.5	24	227	-153,843	7	181	4,557.2	0	0	0.0	0	0
10 - 15	14.2	15	142	-230,764	6	138	6,835.7	0	0	0.0	0	0
15 - 20	19.0	7	63	-307,686	6	155	9,114.3	14	856	0.0	0	0
20 - 25	23.7	12	113	-384,607	1	36	11,392.9	18	1,160	0.0	0	0
25 - 30	28.4	6	52	-461,528	1	20	13,671.5	0	0	0.0	0	0
30 - 35	33.2	0	4	-538,450	16	396	15,950.1	0	0	0.0	0	0
35 - 40	37.9	0	0	-615,371	0	0	18,228.6	0	0	0.0	0	0
40 - 45	42.7	0	0	-692,293	0	0	20,507.2	0	0	0.0	0	0
45 - 50	47.4	0	0	-769,214	0	0	22,785.8	0	0	0.0	0	0
50 - 55	52.1	0	0	-846,136	2	47	25,064.4	0	0	0.0	0	0
55 - 60	56.9	0	0	-923,057	6	154	27,343.0	0	0	0.0	0	0
60 - 65	61.6	5	45	-999,978	2	42	29,621.6	0	0	0.0	0	0
65 - 70	66.4	4	37	-1,076,900	1	17	31,900.1	3	168	0.0	0	0
70 - 75	71.1	2	20	-1,153,821	0	4	34,178.7	4	266	0.0	0	0
75 - 80	75.8	2	15	-1,230,743	2	38	36,457.3	0	0	0.0	0	0
80 - 85	80.6	0	0	-1,307,664	1	20	38,735.9	3	214	0.0	0	0
85 - 90	85.3	1	5	-1,384,585	2	53	41,014.5	5	290	0.0	0	0
90 - 95	90.1	0	0	-1,461,507	0	0	43,293.0	0	0	0.0	0	0
95 - 100	94.8	0	0	-1,538,428	0	0	45,571.6	0	0	0.0	0	0
Hours Off	0.0	0	7,826	0	0	6,258	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	3	2	4	Zone Number
Max. Temp.	88.4	96.8	98.6	96.9	89.5	
Mo./Hr.	7 22	7 23	7 23	7 22	7 24	
Day Type	4	1	1	1	1	
						Number of Hours
Above 100	0	0	0	0	0	
95 - 100	0	30	408	30	0	
90 - 95	0	456	1,232	402	0	
85 - 90	319	984	828	955	972	
80 - 85	1,292	1,381	779	1,384	1,316	
75 - 80	2,061	786	476	871	1,001	
70 - 75	133	184	357	179	383	
65 - 70	1,942	1,444	544	1,452	1,939	
60 - 65	1,297	951	902	947	1,473	
55 - 60	549	621	574	634	712	
50 - 55	471	876	976	879	964	
Below 50	696	1,047	1,684	1,027	0	
Min. Temp.	37.0	38.9	37.4	38.9	54.9	
Mo./Hr.	2 7	2 6	2 13	2 6	2 8	
Day Type	5	4	4	4	3	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Thrm)	GAS DMND On Peak (Thrm/hr)
Jan	8,644	36	1,977	16
Feb	7,860	36	1,783	16
March	7,420	36	1,334	16
April	5,988	36	364	11
May	5,853	55	0	0
June	10,606	103	0	0
July	13,059	119	0	0
Aug	10,941	103	0	0
Sept	5,353	90	0	0
Oct	6,167	36	333	11
Nov	7,040	36	1,142	13
Dec	7,783	36	1,744	16
Total	96,714	119	8,677	16

Building Energy Consumption = 52,993 (Btu/Sq Ft/Year)
Source Energy Consumption = 84,226 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2

WALL & ROOF INSULATION

ELEC	332	289	293	297	313	285	324	293	297	313	352	324	3,710
PK	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1 EQ2001	GAS FIRE TUBE HOT WATER												
GAS	1977	1783	1334	364	0	0	0	0	0	333	1142	1744	8,677
PK	16.0	16.0	15.7	10.6	0.0	0.0	0.0	0.0	0.0	10.5	13.5	16.0	16.0
1 EQ5020	HEAT WATER CIRC. PUMP C.V.												
ELEC	3177	2946	2163	1380	0	0	0	0	0	1245	1991	2655	15,555
PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	769	713	523	334	0	0	0	0	0	301	482	643	3,765
PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307	BOILER CONTROLS												
ELEC	213	198	145	93	0	0	0	0	0	84	133	178	1,043
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 118.9 (kW)
Yearly Time of Peak 11 (hr) 7 (mo)

Hour 11 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	92.9	78.10
Sub Total			92.9	78.10
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND	8.6	7.20	
2	SUMMATION OF FAN ELECTRICAL DEMAND	4.0	3.33	
Sub Total			12.5	10.53
Sub Total			0.0	0.00

Miscellaneous

Lights	13.5	11.37
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	13.5	11.37
Grand Total	118.9	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:47: 6 2/ 3/94
Dataset Name: CB452 .TM

AIRFLOW - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 UV	UV	4,656	31,762	31,762	34,624	7,518	0	0
2 SZ	SZ	3,431	17,156	17,156	18,463	17,156	0	0
3 UH	UH	0	0	2,078	0	0	0	0
Totals		8,087	48,918	50,995	53,088	24,674	0	0

CAPACITY - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Btu/h)	Main Sys. Capacity (Btu/h)	Aux. Sys. Capacity (Btu/h)	Preheat Capacity (Btu/h)	Reheat Capacity (Btu/h)	Humidif. Capacity (Btu/h)	Opt. Vent Capacity (Btu/h)	
1 UV	UV	71.4	0.0	0.0	71.4	-1,038,363		0	0	0	0	0	-1,038,363
2 SZ	SZ	28.7	0.0	0.0	28.7	-410,637		0	0	0	0	0	-410,637
3 UH	UH	0.0	0.0	0.0	0.0	-128,877		0	0	0	0	0	-128,877
Totals		100.1	0.0	0.0	100.1	-1,577,877		0	0	0	0	0	-1,577,877

The building peaked at hour 16 month 7 with a capacity of 99.6 tons

ENGINEERING CHECKS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft/Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	UV	UV	14.66	2.26	444.8	197.1	60.88	2.26	-73.78	14,074	
2 Main	SZ	SZ	20.00	3.48	597.1	171.8	69.86	3.48	-83.21	4,935	
3 Main	UH	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593	

System 1 Block UV - UNIT VENTILATOR

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 7/16						*	Mo/Hr: 7/16			*	Mo/Hr: 13/ 1	
Outside Air ==> DADB/WB/HR: 91/ 73/ 98.0						*	DADB: 91	*	DADB: 4	*	*	
Envelope Loads	Space Sens. + Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,251		90,507	10.56	*	44,331	8.02	*	-38,497	-71,735	7.33
Glass Solar	195,227	0		195,227	22.78	*	212,025	38.37	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.24	*	26,479	4.79	*	-133,751	-133,751	13.66
Wall Cond	154,963	25,463		180,426	21.06	*	165,455	29.94	*	-490,481	-573,762	58.60
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.05
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	109,935			109,935	12.83	*	44,751	8.10	*	-199,361	-199,361	20.36
Sub Total ==>	534,338	69,714		604,052	70.50	*	493,217	89.25	*	-862,545	-979,064	100.00
Internal Loads						*			*			
Lights	36,835	0		36,835	4.30	*	30,432	5.51	*	0	0	0.00
People	49,545			49,545	5.78	*	20,293	3.67	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total ==>	86,379	0	0	86,379	10.08	*	50,724	9.18	*	0	0	0.00
Ceiling Load	10,260	-10,260		0	0.00	*	8,670	1.57	*	-11,842	0	0.00
Outside Air	0	0	0	178,807	20.87	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,776	0.79	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-19,169	0	-19,169	-2.24	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total ==>	630,978	40,285	0	856,845	100.00	*	552,612	100.00	*	-874,387	-979,064	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)				
Main Clg	71.4	856.8	669.3	31,762	80.6	65.3	71.1	58.9	56.5	66.3	14,074
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part 350
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Totals	71.4	856.8									Roof 15,978 0 0
											Wall 12,830 3,646 28

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating	Clg % OA	14.7	Type	Clg	Htg
Main Htg	-1,038.4	31,762	63.3	93.3	Infil	2,862	2,862	0	Clg Cfm/Sqft	2.26	SADB 59.0 93.3
Aux Htg	0.0	0	0.0	0.0	Supply	31,762	31,762	0	Clg Cfm/Ton	444.82	Plenum 78.8 58.8
Preheat	-0.0	31,762	61.9	58.8	Mincfm	0	0	0	Clg Sqft/Ton	197.10	Return 78.8 63.6
Reheat	0.0	0	0.0	0.0	Return	31,762	31,762	0	Clg Btuh/Sqft	60.88	Ret/OA 80.5 63.6
Humidif	0.0	0	0.0	0.0	Exhaust	4,656	4,656	0	No. People	198	Runarnd 75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0	Htg % OA	0.0	Fn MtrTD 0.0 0.0
Total	-1,038.4				Auxil	0	0	0	Htg Cfm/SqFt	2.26	Fn BldTD 0.0 0.0
						0	0	0	Htg Btuh/SqFt	-73.78	Fn Frict 0.1 0.0

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****				
Peaked at Time ==>			Mo/Hr: 7/12			*	Mo/Hr: 7/17			*	Mo/Hr: 13/1		
Outside Air ==>			OADB/WB/HR: 87/ 72/ 98.0			*	OADB: 89			*	OADB: 4		
						*				*			
Envelope Loads	Space Sens. + Lat.	Ret. Air Sensible	Ret. Air Latent	Net Total	Percent Of Tot (%)	*	Space Sensible	Percent Of Tot (%)	Space Peak Sens	Coil Peak Tot Sens	Percent Of Tot (%)		
Skylite Solr	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)	*	(Btuh)	(%)	(Btuh)	(Btuh)	(%)		
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Roof Cond	30,496	0	0	30,496	8.85	*	44,331	16.49	*	-38,497	-38,497	9.37	
Glass Solar	75,357	0	0	75,357	21.86	*	117,002	43.53	*	0	0	0.00	
Glass Cond	10,550	0	0	10,550	3.06	*	14,326	5.33	*	-72,739	-72,739	17.71	
Wall Cond	42,873	0	0	42,873	12.43	*	72,429	26.95	*	-207,867	-207,867	50.62	
Partition	175	0	0	175	0.05	*	175	0.07	*	-455	-455	0.11	
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Infiltration	44,959	0	0	44,959	13.04	*	20,208	7.52	*	-91,079	-91,079	22.18	
Sub Total ==>	204,410	0	0	204,410	59.29	*	268,470	99.88	*	-410,637	-410,637	100.00	
Internal Loads					*	*			*				
Lights	4,548	0	0	4,548	1.32	*	168	0.06	*	0	0	0.00	
People	10,542	0	0	10,542	3.06	*	154	0.06	*	0	0	0.00	
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sub Total ==>	15,090	0	0	15,090	4.38	*	322	0.12	*	0	0	0.00	
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Outside Air	0	0	0	117,958	34.21	*	0	0.00	*	0	0	0.00	
Sup. Fan Heat				7,320	2.12	*		0.00	*			0.00	
Ret. Fan Heat	0	0	0	0	0.00	*		0.00	*			0.00	
Duct Heat Pkup	0	0	0	0	0.00	*		0.00	*			0.00	
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Exhaust Heat	0	0	0	0	0.00	*		0.00	*			0.00	
Terminal Bypass	0	0	0	0	0.00	*		0.00	*			0.00	
Grand Total ==>	219,500	0	0	344,778	100.00	*	268,793	100.00	*	-410,637	-410,637	100.00	

COOLING COIL SELECTION									AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (Mbh)	Entering DB/WB/HR (cfm)	Deg F	Deg F	Grains	Leaving DB/WB/HR (Deg F)	Deg F	Deg F	Grains	Gross Total Floor	Glass (sf) (%)
Main Clg	28.7	344.8	235.7	17,156	77.4	64.5	72.8	60.2	58.1	70.8	Part	350
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	5,356
Totals	28.7	344.8									Wall	5,231
												1,983 38

HEATING COIL SELECTION					AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating	Clg % OA	20.0	Type	Clg	Htg	
Main Htg	-410.6	17,156	68.0	90.0	Infil	1,308	1,308	0	Clg Cfm/Sqft	3.48	SADB	60.6
Aux Htg	0.0	0	0.0	0.0	Supply	17,156	17,156	Clg Cfm/Ton	597.10	Plenum	75.0	68.0
Preheat	-0.0	17,156	68.0	60.2	Min cfm	0	0	Clg Sqft/Ton	171.76	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	17,156	17,156	No. People	69.86	Ret/OA	77.4	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,431	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	3.48	Fn BldTD	0.1	0.0
Total	-410.6				Auxil	0	0	Htg Btu/SqFt	-83.21	Fn Frict	0.2	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 0/ 0						*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1	
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0						*	OADB: 0			*	OADB: .4	
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0	0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Total Gross	Areas Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	Roof	3,593 0 0
Totals	0.0	0.0					Wall	2,000 0 0

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	0.0	Type	Clg	Htg	
Main Htg	-128.9	2,078	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,078	Clg Cfm/Ton	0.00	Plenum	0.0	43.2
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	2,078	No. People	0	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.58	Fn BldTD	0.0	0.0
Total	-128.9				Auxil	0	0	Htg Btuh/SqFt	-35.87	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)						Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)	
			Summr ExFlr	Wintr Skylt	Summr Skylt	Wintr Roof	Summr Windo	Wintr Windo	Wall	Ceil.	
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2 17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9 16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4 16.14
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1 16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3 17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5 18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7 13.66
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3 17.69
System	1 Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3 16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8 16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6 13.89
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6 13.89
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6 13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5 16.46

BUILDING AREAS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

- B U I L D I N G A R E A S -

Room Number	Description	Floor Dupl	Floor	Total	Exposed	Window Area	Win /Wl (%)	Net Wall Area
			Area/Dupl	Floor Area (sqft)	Partition Area (sqft)			
Flr	Rm	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(%)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	1,950
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	2,550
3	ASSEMBLY	1	1	2,063	2,063	0	0	1,892
Zone	1 Total/Ave.			6,037	0	0	0	6,392
4	NAVE	1	1	4,935	4,935	350	0	5,356
Zone	2 Total/Ave.			4,935	350	0	0	5,356
5	CLASS RM	1	1	1,310	1,310	0	0	1,806
6	CLASS RM	1	1	1,664	1,664	0	0	2,226
7	VESTIBULE	1	1	128	128	0	0	198
Zone	3 Total/Ave.			3,102	0	0	0	4,230
System	1 Total/Ave.			14,074	350	0	0	15,978
4	NAVE	1	1	4,935	4,935	350	0	5,356
Zone	2 Total/Ave.			4,935	350	0	0	5,356
System	2 Total/Ave.			4,935	350	0	0	5,356
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	3,593
Zone	4 Total/Ave.			3,593	0	0	0	3,593
System	3 Total/Ave.			3,593	0	0	0	3,593
Building				22,602	700	0	0	24,927
								5,630
							28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

- A S H R A E 9 0 A N A L Y S I S -

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.0	13	107	-78,894	49	1,268	2,549.8	53	3,372	0.0	0	0
5 - 10	10.0	31	263	-157,788	9	239	5,099.5	0	0	0.0	0	0
10 - 15	15.0	15	130	-236,682	5	134	7,649.3	0	0	0.0	0	0
15 - 20	20.0	12	102	-315,575	5	133	10,199.1	14	856	0.0	0	0
20 - 25	25.0	11	94	-394,469	1	29	12,748.8	18	1,160	0.0	0	0
25 - 30	30.0	4	38	-473,363	1	38	15,298.6	0	0	0.0	0	0
30 - 35	35.0	0	0	-552,257	15	388	17,848.3	0	0	0.0	0	0
35 - 40	40.1	0	0	-631,151	0	0	20,398.1	0	0	0.0	0	0
40 - 45	45.1	0	0	-710,045	0	0	22,947.9	0	0	0.0	0	0
45 - 50	50.1	0	0	-788,939	0	0	25,497.6	0	0	0.0	0	0
50 - 55	55.1	2	19	-867,832	3	83	28,047.4	0	0	0.0	0	0
55 - 60	60.1	2	18	-946,726	5	118	30,597.2	0	0	0.0	0	0
60 - 65	65.1	5	45	-1,025,620	2	42	33,146.9	0	0	0.0	0	0
65 - 70	70.1	4	35	-1,104,514	1	17	35,696.7	3	168	0.0	0	0
70 - 75	75.1	1	5	-1,183,408	0	8	38,246.5	4	266	0.0	0	0
75 - 80	80.1	0	0	-1,262,302	2	50	40,796.2	0	0	0.0	0	0
80 - 85	85.1	0	0	-1,341,195	1	37	43,346.0	0	0	0.0	0	0
85 - 90	90.1	0	0	-1,420,089	1	20	45,895.8	8	504	0.0	0	0
90 - 95	95.1	0	0	-1,498,983	0	0	48,445.5	0	0	0.0	0	0
95 - 100	100.1	0	0	-1,577,877	0	0	50,995.3	0	0	0.0	0	0
Hours Off	0.0	0	7,904	0	0	6,156	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	3	2	4	Zone Number
Max. Temp.	89.3	98.2	99.9	98.4	91.3	
Mo./Hr.	7 23	7 23	7 24	7 23	7 24	
Day Type	4	1	1	1	1	
						Number of Hours
Above 100	0	0	0	0	0	
95 - 100	0	45	456	45	0	
90 - 95	0	542	1,188	473	90	
85 - 90	405	1,074	776	1,065	971	
80 - 85	1,301	1,278	834	1,252	1,243	
75 - 80	1,947	695	486	804	1,013	
70 - 75	291	203	360	198	355	
65 - 70	2,034	1,487	553	1,503	1,963	
60 - 65	1,167	937	876	925	1,334	
55 - 60	530	612	643	611	752	
50 - 55	458	858	714	875	1,039	
Below 50	717	1,029	1,874	1,009	0	
Min. Temp.	37.1	39.1	36.9	39.1	54.9	
Mo./Hr.	2 7	2 12	2 12	2 12	1 7	
Day Type	5	3	4	3	3	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Thrm)	GAS DMND On Peak (Thrm/hr)
Jan	8,751	38	2,001	16
Feb	7,962	38	1,797	16
March	7,646	38	1,336	16
April	6,089	38	380	10
May	6,248	57	11	1
June	10,653	105	0	0
July	13,211	114	0	0
Aug	10,882	105	0	0
Sept	5,340	88	0	0
Oct	6,442	38	389	11
Nov	7,195	38	1,164	13
Dec	8,067	38	1,761	16
Total	98,487	114	8,839	16

Building Energy Consumption = 53,980 (Btu/Sq Ft/Year)
Source Energy Consumption = 85,787 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

- EQUIPMENT ENERGY CONSUMPTION --

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

ELEC	370	322	326	330	348	317	361	326	330	348	392	361	4,132
PK	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
1 EQ2001	GAS FIRE TUBE HOT WATER												
GAS	2001	1797	1336	380	11	0	0	0	0	389	1164	1761	8,839
PK	16.3	16.3	15.8	10.5	0.6	0.0	0.0	0.0	0.0	10.5	13.3	16.3	16.3
1 EQ5020	HEAT WATER CIRC. PUMP C.V.												
ELEC	3087	2871	2163	1298	134	0	0	0	0	1283	1939	2707	15,481
PK	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	747	695	523	314	32	0	0	0	0	310	469	655	3,747
PK	1.8	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307	BOILER CONTROLS												
ELEC	207	192	145	87	9	0	0	0	0	86	130	182	1,038
PK	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 114.5 (kW)
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eq.	Ref.	Equipment	Utility Demand (kW)	Percent Of Tot (%)
	Num.	Code Name		

Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	88.5	77.34
Sub Total			88.5	77.34
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.8	8.59
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.4	3.85
Sub Total			14.2	12.44
Sub Total			0.0	0.00

Miscellaneous

Lights		11.7	10.22
Base Utilities		0.0	0.00
Misc Equipment		0.0	0.00
Sub Total		11.7	10.22
Grand Total		114.5	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:18:43 2/ 3/94
Dataset Name: CB452 .TM

AIRFLOW - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 UV	UV	4,569	31,185	31,185	34,735	8,119	0	0
2 SZ	SZ	3,368	16,839	16,839	18,461	16,839	0	0
3 UH	UH	0	0	2,078	0	0	0	0
Totals		7,937	48,025	50,102	53,196	24,958	0	0

CAPACITY - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 UV	UV	73.2	0.0	0.0	73.2	-1,079,304		0	0	0	0	0	-1,079,304
2 SZ	SZ	29.4	0.0	0.0	29.4	-432,496		0	0	0	0	0	-432,496
3 UH	UH	0.0	0.0	0.0	0.0	-128,877		0	0	0	0	0	-128,877
Totals		102.6	0.0	0.0	102.6	-1,640,677		0	0	0	0	0	-1,640,677

The building peaked at hour 16 month 7 with a capacity of 102.0 tons

ENGINEERING CHECKS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	UV		14.65	2.22	426.3	192.4	62.37	2.22	-76.69			14,074
2 Main	SZ		20.00	3.41	572.0	167.6	71.58	3.41	-87.64			4,935
3 Main	UH		0.00	0.00	0.0	0.0	0.00	0.58	-35.87			3,593

System 1 Block UV - UNIT VENTILATOR

COOLING COIL PEAK						CLG SPACE PEAK			HEATING COIL PEAK			
Peaked at Time ==> Mo/Hr: 7/16						*	Mo/Hr: 7/16			Mo/Hr: 13/ 1		
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0						*	OADB: 91			OADB: 4		
						*						
Envelope Loads	Space Sens. & Lat. (Btu/h)	Rat. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,263		90,519	10.31	*	44,331	7.90	*	-38,497	-71,866	7.00
Glass Solar	195,227	0		195,227	22.24	*	212,025	37.76	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.16	*	26,479	4.72	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,493		180,456	20.56	*	165,455	29.47	*	-490,481	-574,097	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.53	*	55,492	9.88	*	-247,207	-247,207	24.06
Sub Total==>	560,723	69,756		630,478	71.82	*	503,957	89.76	*	-910,391	-1,027,376	100.00
Internal Loads					*			*				
Lights	34,390	0		34,390	3.92	*	28,414	5.06	*	0	0	0.00
People	49,545			49,545	5.64	*	20,293	3.61	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	83,935	0	0	83,935	9.56	*	48,707	8.67	*	0	0	0.00
Ceiling Load	10,206	-10,206		0	0.00	*	8,804	1.57	*	-12,031	0	0.00
Outside Air	0	0	0	175,474	19.99	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,653	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-18,711	0	-18,711	-2.13	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	654,863	40,839	0	877,829	100.00	*	561,468	100.00	*	-922,422	-1,027,376	100.00

COOLING COIL SELECTION											
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering Deg F	DB/WB/HR	Leaving Deg F	DB/WB/HR	Gross Total	Glass (sf) (%)			
Main Clg	73.2	877.8	677.4	31,185	80.6	65.3	71.1	58.3	56.1	65.4	14,074
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	350
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr
Totals	73.2	877.8									Roof
											Wall

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating	Clg % OA	14.7	Type	Clg	Htg
Main Htg	-1,079.3	31,185	63.4	95.2	Infil	3,550	3,550	0	Clg Cfm/Sqft	2.22	SAD8
Aux Htg	0.0	0	0.0	0.0	Supply	31,185	31,185	0	Clg Cfm/Ton	426.31	Plenum
Preheat	-0.0	31,185	62.0	58.3	Mincfm	0	0	0	Clg Sqft/Ton	192.39	Return
Reheat	0.0	0	0.0	0.0	Return	31,185	31,185	No. People	Clg Btuh/Sqft	62.37	Ret/OA
Humidif	0.0	0	0.0	0.0	Exhaust	4,569	0	198	Runarnd	80.5	63.7
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	0.0	Fn MtrTD	75.0	68.0
Total	-1,079.3				Auxil	0	0	76.69	Fn BldTD	0.0	0.0
									Fn Frict	0.1	0.0

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/12 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1

Outside Air ==> DADB/WB/HR: 87/ 72/ 98.0 * OADB: 89 * DADB: 4 *

	Space Sens. & Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0		30,496	8.63	*	44,331	16.20	*	-38,497	-38,497	8.90
Glass Solar	75,357	0		75,357	21.33	*	117,002	42.76	*	0	0	0.00
Glass Cond	10,550	0		10,550	2.99	*	14,326	5.24	*	-72,739	-72,739	16.82
Wall Cond	42,873	0		42,873	12.14	*	72,429	26.47	*	-207,867	-207,867	48.06
Partition	175			175	0.05	*	175	0.06	*	-455	-455	0.11
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	55,749			55,749	15.78	*	25,058	9.16	*	-112,938	-112,938	26.11
Sub Total ==>	215,200	0		215,200	60.92	*	273,320	99.83	*	-432,496	-432,496	100.00
Internal Loads						*			*			
Lights	4,548	0		4,548	1.29	*	168	0.06	*	0	0	0.00
People	10,545			10,542	2.98	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total ==>	15,090	0	0	15,090	4.27	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				7,185	2.03	*		0.00	*		0	0.00
Ret. Fan Heat	0			0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup	0			0	0.00	*		0.00	*		0	0.00
OV/UHDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass	0	0	0	0	0.00	*		0.00	*		0	0.00
Grand Total ==>	230,290	0	0	353,258	100.00	*	273,643	100.00	*	-432,496	-432,496	100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Gross Total Floor	Glass (sf) (%)					
Main Clg	29.4	353.3	238.8	16,839	77.4	64.5	72.8	59.7	57.8	70.3	Part 4,935
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 350
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof 5,356 0 0
Totals	29.4	353.3									Wall 5,231 1,983 38

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating	Clg % OA	20.0	Type	Clg	Htg	
Main Htg	-432.5	16,839	68.0	91.6	Infil	1,622	0	Clg Cfm/Sqft	3.41	SADB	60.1	91.6
Aux Htg	0.0	0	0.0	0.0	Supply	16,839	1,622	Clg Cfm/Ton	572.02	Plenum	75.0	68.0
Preheat	-0.0	16,839	68.0	59.7	Mincfm	0	0	Clg Sqft/Ton	167.64	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	16,839	16,839	No. People	70	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,368	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	3.41	Fn BldTD	0.1	0.0
Total	-432.5				Auxil	0	0	Htg Btuh/SqFt	-87.64	Fn Frict	0.2	0.0

-----AREAS-----

-----ENGINEERING CHECKS--

-----TEMPERATURES (F)---

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==>	Mo/Hr: 0 / 0		*	Mo/Hr: 0 / 0		*	Mo/Hr: 13 / 1				
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0		*	OADB: 0		*	OADB: 4				
			*			*					
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877
Internal Loads					*				*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	
Ret. Fan Heat		0		0	0.00	*			0.00	*	
Duct Heat Pkup		0		0	0.00	*			0.00	*	
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	
Terminal Bypass		0	0	0	0.00	*			0.00	*	
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877
											100.00

COOLING COIL SELECTION									AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering Deg F	DB/WB/HR	Leaving Deg F	DB/WB/HR	Gross Total	Glass (sf)	(%)		
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	0		
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Exflr	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	Roof	3,593	0	0
Totals	0.0	0.0						Wall	2,000	0	0

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-128.9	2,078	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	43.2
Reheat	0.0	0	0.0	0.0	Return	0	2,078	Clg Btuh/Sqft	0.00	Ret/OA	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0
Total	-128.9				Auxil	0	0	Htg Cfm/SqFt	0.58	Fn BldTD	0.0
							0	Htg Btuh/SqFt	-35.87	Fn Frict	0.0

BUILDING U-VALUES - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values						Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Roof Windo		Wintr Windo			
			ExFlr	Summr Windo	Roof	Windo	Wall	Ceil.				
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60
	4 NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
	5 CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
	6 CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
	7 VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System	1 Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
	4 NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
	8 MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46

BUILDING AREAS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- BUILDING AREAS -----

Room Number	Description	Floor		Total	Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Number of Duplicate	Area/Dupl Room	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)						
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	1,950	341	22
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	2,550	403	23
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	1,892	328	20
Zone	1 Total/Ave.			6,037	0	0	0	0	0	6,392	1,071	22
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38
Zone	2 Total/Ave.			4,935	350	0	0	0	0	5,356	1,983	38
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	1,806	181	18
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	2,226	219	16
7	VESTIBULE	1	1	128	128	0	0	0	0	198	192	80
Zone	3 Total/Ave.			3,102	0	0	0	0	0	4,230	592	22
System	1 Total/Ave.			14,074	350	0	0	0	0	15,978	3,646	28
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38
Zone	2 Total/Ave.			4,935	350	0	0	0	0	5,356	1,983	38
System	2 Total/Ave.			4,935	350	0	0	0	0	5,356	1,983	38
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	3,593	0	0
Zone	4 Total/Ave.			3,593	0	0	0	0	0	3,593	0	0
System	3 Total/Ave.			3,593	0	0	0	0	0	3,593	0	0
Building				22,602	700	0	0	0	0	24,927	5,630	28
												14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	5.1	18	144	-82,034	47	1,234	2,505.1	53	3,372	0.0	0	0
5 - 10	10.3	29	240	-164,068	10	251	5,010.2	0	0	0.0	0	0
10 - 15	15.4	17	137	-246,102	6	149	7,515.4	0	0	0.0	0	0
15 - 20	20.5	6	51	-328,135	5	141	10,020.5	14	856	0.0	0	0
20 - 25	25.6	11	86	-410,169	1	26	12,525.6	18	1,160	0.0	0	0
25 - 30	30.8	5	38	-492,203	1	14	15,030.7	0	0	0.0	0	0
30 - 35	35.9	0	0	-574,237	15	379	17,535.8	0	0	0.0	0	0
35 - 40	41.0	0	0	-656,271	1	33	20,041.0	0	0	0.0	0	0
40 - 45	46.2	5	37	-738,305	0	0	22,546.1	0	0	0.0	0	0
45 - 50	51.3	0	0	-820,339	0	0	25,051.2	0	0	0.0	0	0
50 - 55	56.4	0	0	-902,372	2	47	27,556.3	0	0	0.0	0	0
55 - 60	61.6	1	8	-984,406	6	154	30,061.5	0	0	0.0	0	0
60 - 65	66.7	5	37	-1,066,440	2	42	32,566.6	0	0	0.0	0	0
65 - 70	71.8	5	40	-1,148,474	1	21	35,071.7	3	168	0.0	0	0
70 - 75	76.9	0	0	-1,230,508	0	4	37,576.8	4	266	0.0	0	0
75 - 80	82.1	0	0	-1,312,542	2	50	40,081.9	0	0	0.0	0	0
80 - 85	87.2	0	0	-1,394,576	1	37	42,587.1	0	0	0.0	0	0
85 - 90	92.3	0	0	-1,476,609	1	20	45,092.2	8	504	0.0	0	0
90 - 95	97.5	0	0	-1,558,643	0	0	47,597.3	0	0	0.0	0	0
95 - 100	102.6	0	0	-1,640,677	0	0	50,102.4	0	0	0.0	0	0
Hours Off	0.0	0	7,942	0	0	6,158	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	3	2	4	Zone Number
Max. Temp.	89.0	97.8	99.3	98.0	91.3	
Mo./Hr.	7 24	7 23	7 24	7 23	7 24	
Day Type	4	1	1	1	1	
						Number of Hours
Above 100	0	0	0	0	0	
95 - 100	0	45	372	45	0	
90 - 95	0	479	1,156	390	90	
85 - 90	363	1,059	683	1,058	971	
80 - 85	1,318	1,278	970	1,250	1,243	
75 - 80	1,895	731	537	853	1,013	
70 - 75	245	229	306	225	355	
65 - 70	1,984	1,419	557	1,425	1,963	
60 - 65	1,201	956	940	954	1,334	
55 - 60	538	557	525	572	752	
50 - 55	462	692	793	875	1,039	
Below 50	754	1,113	1,316	1,113	0	
Min. Temp.	36.6	38.4	36.5	38.5	54.9	
Mo./Hr.	2 7	2 12	2 13	2 11	1 7	
Day Type	5	3	4	3	3	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Therm)	GAS DMND On Peak (Thrm/hr)
Jan	8,547	36	2,085	17
Feb	7,778	36	1,877	17
March	7,426	36	1,413	17
April	6,052	36	451	11
May	5,350	55	0	0
June	10,124	106	0	0
July	13,009	115	0	0
Aug	10,241	106	0	0
Sept	4,665	80	0	0
Oct	6,395	36	456	11
Nov	6,999	36	1,225	14
Dec	7,873	36	1,830	17
Total	94,458	115	9,336	17

Building Energy Consumption = 55,572 (Btu/Sq Ft/Year)
Source Energy Consumption = 86,277 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

- EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

	ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
	PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1 EQ2001 GAS FIRE TUBE HOT WATER														
GAS		2085	1877	1413	451	0	0	0	0	0	456	1225	1830	9,336
PK		17.1	17.1	16.5	11.1	0.0	0.0	0.0	0.0	0.0	11.1	13.7	17.1	17.1
1 EQ5020 HEAT WATER CIRC. PUMP C.V.														
ELEC		3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
PK		7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240 BOILER FORCED DRAFT FAN														
ELEC		747	695	523	343	-0	0	0	0	0	341	469	655	3,774
PK		1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307 BOILER CONTROLS														
ELEC		207	192	145	95	0	0	0	0	0	94	130	182	1,046
PK		0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
REPLACE FLUORESCENT LAMPS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 115.3 (kW)
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eq.	Ref.	Equipment	Utility Demand (kW)	Percent Of Tot (%)
	Num.	Code Name		

Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	90.1	78.13
Sub Total			90.1	78.13
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.7	8.37
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.3	3.75
Sub Total			14.0	12.12
Sub Total			0.0	0.00

Miscellaneous

Lights	11.2	9.75
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	11.2	9.75
Grand Total	115.3	100.00

** **
** TRACE 600 ANALYSIS **
** by **
** **

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: -5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15: 3:40 2/ 3/94
Dataset Name: CB452B .TM

AIRFLOW - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- SYSTEM SUMMARY -----

(Design Airflow Quantities)

System Number	System Type	Main				Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)		
1 UV	UV	4,552	30,998	30,998	34,548	8,102	0
2 SZ	SZ	3,368	16,839	16,839	18,461	16,839	0
3 UH	UH	0	0	2,078	0	0	0
Totals		7,920	47,837	49,915	53,009	24,941	0

CAPACITY - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- SYSTEM SUMMARY -----

(Design Capacity Quantities)

System Number	System Type	Cooling				Heating				Heating Totals (Btu/h)	
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btu/h)	Aux. Sys. Capacity (Btu/h)	Preheat Capacity (Btu/h)	Reheat Capacity (Btu/h)	
1 UV	UV	72.8	0.0	0.0	72.8	-1,077,553	0	0	0	0	-1,077,553
2 SZ	SZ	29.4	0.0	0.0	29.4	-432,496	0	0	0	0	-432,496
3 UH	UH	0.0	0.0	0.0	0.0	-128,877	0	0	0	0	-128,877
Totals		102.2	0.0	0.0	102.2	-1,638,925	0	0	0	0	-1,638,925

The building peaked at hour 16 month 7 with a capacity of 101.6 tons

ENGINEERING CHECKS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	UV	UV	14.69	2.20	425.9	193.4	62.05	2.20	-76.56	14,074	
2 Main	SZ	SZ	20.00	3.41	572.0	167.6	71.58	3.41	-87.64	4,935	
3 Main	UH	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593	

System 1 Block UV - UNIT VENTILATOR

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==>	Mo/Hr: 7/16		*	Mo/Hr: 7/16		*	Mo/Hr: 13/ 1		*			
Outside Air ==>	DADB/WB/HR: 91/ 73/ 98.0		*	DADB: 91		*	DADB: 4		*			
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,241		90,497	10.36	*	44,331	7.94	*	-38,497	-71,863	6.99
Glass Solar	195,227	0		195,227	22.35	*	212,025	37.96	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.18	*	26,479	4.74	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,447		180,410	20.66	*	165,455	29.63	*	-490,481	-574,090	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.61	*	55,492	9.94	*	-247,207	-247,207	24.06
Sub Total==>	560,723	69,688		650,411	72.19	*	503,957	90.24	*	-910,391	-1,027,366	100.00
Internal Loads						*			*			
Lights	30,724	0		30,724	3.52	*	25,388	4.55	*	0	0	0.00
People	49,545			49,545	5.67	*	20,293	3.63	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	80,268	0	0	80,268	9.19	*	45,681	8.18	*	0	0	0.00
Ceiling Load	10,301	-10,301		0	0.00	*	8,852	1.58	*	-12,094	0	0.00
Outside Air	0	0	0	174,838	20.02	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,613	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	-18,818	0	-18,818	-2.15	*		0.00	*		0	0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	651,292	40,570	0	873,313	100.00	*	558,489	100.00	*	-922,485	-1,027,366	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Grains	Leaving DB/WB/HR Deg F	Deg F	Grains	Gross Floor	Glass (sf)	(%)
Main Clg	72.8	873.3	673.2	30,998	80.6	65.3	71.1	58.3	56.1	65.5	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	
Totals	72.8	873.3							14,074		
									Part	350	
									ExFlr	0	
									Roof	15,978	0
									Wall	12,830	3,646 28

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating Mincfm	Clg % OA	14.7	Type	Clg	Htg
Main Htg	-1,077.6	30,998	63.4	95.3	Infil	3,550	3,550	Clg Cfm/Sqft	2.20	SADB	58.4 95.3
Aux Htg	0.0	0	0.0	0.0	Supply	30,998	30,998	Clg Cfm/Ton	425.94	Plenum	78.8 59.0
Preheat	-0.0	30,998	62.1	58.2	Mincfm	0	0	Clg Sqft/Ton	193.39	Return	78.8 63.8
Reheat	0.0	0	0.0	0.0	Return	30,998	30,998	No. People	198	Runarnd	75.0 68.0
Humidif	0.0	0	0.0	0.0	Exhaust	4,552	0	Htg % OA	0.0	Fn MtrTD	0.0 0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	2.20	Fn BldTD	0.0 0.0
Total	-1,077.6				Auxil	0	0	Htg Btuh/SqFt	-76.56	Fn Frict	0.1 0.0

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==>	Mo/Hr: 7/12		*	Mo/Hr: 7/17		*	Mo/Hr: 13/ 1		*			
Outside Air ==>	DADB/WB/HR: 87/ 72/ 98.0		*	DADB: 89		*	DADB: 4		*			
Envelope Loads	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0		30,496	8.63	*	44,331	16.20	*	-38,497	-38,497	8.90
Glass Solar	75,357	0		75,357	21.33	*	117,002	42.76	*	0	0	0.00
Glass Cond	10,550	0		10,550	2.99	*	14,326	5.24	*	-72,739	-72,739	16.82
Wall Cond	42,873	0		42,873	12.14	*	72,429	26.47	*	-207,867	-207,867	48.06
Partition	175			175	0.05	*	175	0.06	*	-455	-455	0.11
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	55,745			55,745	15.78	*	25,058	9.16	*	-112,938	-112,938	26.11
Sub Total==>	215,200	0		215,200	60.92	*	273,320	99.88	*	-432,496	-432,496	100.00
Internal Loads						*			*			
Lights	4,548	0		4,548	1.29	*	168	0.06	*	0	0	0.00
People	10,542			10,542	2.98	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.27	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				7,185	2.03	*		0.00	*			0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*			0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*		0.00	*			0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*			0.00
					*				*			
Grand Total==>	230,290	0	0	353,258	100.00	*	273,643	100.00	*	-432,496	-432,496	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)				
Main Clg	29.4	353.3	238.8	16,839	77.4	64.5	72.8	59.7	57.8	70.3	4,935
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	350
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
Totals	29.4	353.3									0

HEATING COIL SELECTION				AIRFLOWS (cfm)				ENGINEERING CHECKS--		TEMPERATURES (F)	
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 3,368	Clg % OA 0	20.0	Type	Clg 3.41	Htg 91.6
Main Htg	-432.5	16,839	68.0	91.6	Infil	1,622	1,622	Clg Cfm/Sqft 3.41	SADB 60.1	Plenum 75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	16,839	16,839	Clg Cfm/Ton 572.02	ExFlr 0	Return 75.0	68.0
Preheat	-0.0	16,839	68.0	59.7	Mincfm	0	0	Clg Sqft/Ton 167.64	Roof 5,356	Ret/DA 77.4	68.0
Reheat	0.0	0	0.0	0.0	Return	16,839	16,839	No. People 71.58	Runarnd 0.1	Fn MtrTD 0.1	0.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,368	0	Htg % DA 0.0	Fn BldTD 0.1	Fn Frict 0.2	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt 3.41			
Total	-432.5				Auxil	0	0	Htg Btuh/SqFt -87.64			

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0 / 0 * Mo/Hr: 0 / 0 * Mo/Hr: 13 / 1

Outside Air ==> OADB/WB/HR: 0 / 0 / 0.0 * OADB: 0 * OADB: 4 *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		0	0	0	0.00	*			0.00	*	0.00
Terminal Bypass		0	0	0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877
						*					100.00

-----COOLING COIL SELECTION-----

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	Roof	3,593	0 0
Totals	0.0	0.0	0	0.00	Wall	2,000	0 0

-----HEATING COIL SELECTION-----

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-128.9	2,078	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,078	Clg Cfm/Ton	0.00	Plenum	0.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	43.2
Reheat	0.0	0	0.0	0.0	Return	0	2,078	No. People	0	Ret/OA	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.58	Fn MtrTD	0.0
Total	-128.9				Auxil	0	0	Htg Btuh/SqFt	-35.87	Fn BldTD	0.0
								Htg Frict	0.0		0.0

-----AREAS-----

3,593		
Part	0	
ExFlr	0	
Roof	3,593	0 0
Wall	2,000	0 0

-----AIRFLOWS (cfm)-----

--ENGINEERING CHECKS--

--TEMPERATURES (F)--

BUILDING U-VALUES - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)		
			Summr Skylt		Wintr Skylt		Summr Roof		Wintr Windo					
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.				
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73		
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18		
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14		
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60		
	4 NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92		
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92		
	5 CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49		
	6 CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15		
	7 VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66		
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69		
System	1 Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95		
	4 NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92		
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92		
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92		
	8 MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89		
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89		
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89		
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46		

BUILDING AREAS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- BUILDING AREAS -----

Room Number	Description	Floor Flr	Number of Duplicate Rm	Floor Area/Dupl	Total Room Area (sqft)	Total Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
				(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(%)	(sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	5.1	18	144	-81,946	47	1,218	2,495.8	53	3,372	0.0	0	0
5 - 10	10.2	28	224	-163,892	10	271	4,991.5	0	0	0.0	0	0
10 - 15	15.3	17	137	-245,839	6	145	7,487.3	0	0	0.0	0	0
15 - 20	20.4	6	51	-327,785	6	145	9,983.0	14	856	0.0	0	0
20 - 25	25.6	11	86	-409,731	1	26	12,478.8	18	1,160	0.0	0	0
25 - 30	30.7	5	38	-491,677	0	9	14,974.6	0	0	0.0	0	0
30 - 35	35.8	0	0	-573,624	15	384	17,470.3	0	0	0.0	0	0
35 - 40	40.9	0	0	-655,570	1	33	19,966.1	0	0	0.0	0	0
40 - 45	46.0	5	37	-737,516	0	0	22,461.8	0	0	0.0	0	0
45 - 50	51.1	0	0	-819,463	0	0	24,957.6	0	0	0.0	0	0
50 - 55	56.2	0	0	-901,409	2	47	27,453.4	0	0	0.0	0	0
55 - 60	61.3	1	8	-983,355	5	138	29,949.1	0	0	0.0	0	0
60 - 65	66.4	5	37	-1,065,301	2	54	32,444.9	0	0	0.0	0	0
65 - 70	71.5	5	40	-1,147,248	1	21	34,940.6	3	168	0.0	0	0
70 - 75	76.7	0	0	-1,229,194	0	8	37,436.4	4	266	0.0	0	0
75 - 80	81.8	0	0	-1,311,140	1	34	39,932.2	0	0	0.0	0	0
80 - 85	86.9	0	0	-1,393,087	1	37	42,427.9	0	0	0.0	0	0
85 - 90	92.0	0	0	-1,475,033	1	36	44,923.7	3	214	0.0	0	0
90 - 95	97.1	0	0	-1,556,979	0	0	47,419.4	5	290	0.0	0	0
95 - 100	102.2	0	0	-1,638,925	0	0	49,915.2	0	0	0.0	0	0
Hours Off	0.0	0	7,958	0	0	6,154	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- BUILDING TEMPERATURE PROFILES -----

Temperature ----- Zone Number -----

Range (F)	1	2	3	2	4
--------------	---	---	---	---	---

Max. Temp.	88.9	97.8	99.1	98.0	91.3
Mo./Hr.	7 22	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1

..... Number of Hours

Above 100	0	0	0	0	0
95 - 100	0	45	318	45	0
90 - 95	0	479	1,165	390	90
85 - 90	363	1,059	721	1,055	971
80 - 85	1,318	1,278	974	1,250	1,243
75 - 80	1,890	731	528	853	1,013
70 - 75	233	229	255	225	355
65 - 70	1,981	1,419	590	1,425	1,963
60 - 65	1,221	956	940	954	1,334
55 - 60	538	559	522	572	752
50 - 55	457	892	831	875	1,039
Below 50	759	1,113	1,916	1,113	0

Min. Temp.	36.5	38.4	36.5	38.5	54.9
Mo./Hr.	2 7	2 12	2 13	2 11	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	GAS	GAS DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	8,279	35	2,091	17
Feb	7,536	35	1,882	17
March	7,133	35	1,420	17
April	5,796	35	452	11
May	5,038	53	0	0
June	9,652	105	0	0
July	12,703	114	0	0
Aug	9,898	105	0	0
Sept	4,330	78	0	0
Oct	6,115	35	462	11
Nov	6,744	35	1,231	14
Dec	7,817	35	1,835	17
Total	90,391	114	9,373	17

Building Energy Consumption = 55,194 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

Source Energy Consumption = 84,930 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

EQUIPMENT ENERGY CONSUMPTION -

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

	ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
	PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1 EQ2001 GAS FIRE TUBE HOT WATER														
	GAS	2091	1892	1420	452	0	0	0	0	0	462	1231	1835	9,373
	PK	17.0	17.0	16.6	11.1	0.0	0.0	0.0	0.0	0.0	11.1	13.9	17.0	17.0
1 EQ5020 HEAT WATER CIRC. PUMP C.V.														
	ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240 BOILER FORCED DRAFT FAN														
	ELEC	747	695	523	343	0	0	0	0	0	341	469	655	3,774
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307 BOILER CONTROLS														
	ELEC	207	192	145	95	0	0	0	0	0	94	130	182	1,046
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
REPLACE FLUORESCENT BALLASTS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 114.5 (kW)
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment				
1	EQ1122L	AIR-CLD RECIP >55 TONS	90.0	78.59
Sub Total			90.0	78.59
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	9.6	8.40
2		SUMMATION OF FAN ELECTRICAL DEMAND	4.3	3.78
Sub Total			13.9	12.17
Sub Total			0.0	0.00
Miscellaneous				
Lights			10.6	9.23
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			10.6	9.23
Grand Total			114.5	100.00

```
*****
*****  
**          TRACE    600    ANALYSIS      **  
**  
**          by           **  
**  
*****  
*****
```

ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)

Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20

Air Density:	0.0742	(lbm/cuft)
Air Specific Heat:	0.2444	($\text{Btu}/\text{lbm}/\text{F}$)
Density-Specific Heat Prod:	1.0882	($\text{Btu-min.}/\text{hr}/\text{cuft}/\text{F}$)
Latent Heat Factor:	4,790.2	($\text{Btu-min.}/\text{hr}/\text{cuft}$)
Enthalpy Factor:	4.4519	($\text{Lb-min.}/\text{hr}/\text{cuft}$)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:35: 5 2 / 3/94
Dataset Name: CB452B .TM

AIRFLOW - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- SYSTEM SUMMARY -----

(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 UV	UV	4,541	30,864	30,864	34,413	8,090	0	0
2 SZ	SZ	3,368	16,839	16,839	18,461	16,839	0	0
3 UH	UH	0	0	2,078	0	0	0	0
Totals		7,908	47,703	49,780	52,874	24,929	0	0

CAPACITY - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- SYSTEM SUMMARY -----

(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 UV	UV	72.5	0.0	0.0	72.5	-1,076,294		0	0	0	0	0	-1,076,294
2 SZ	SZ	29.4	0.0	0.0	29.4	-432,496		0	0	0	0	0	-432,496
3 UH	UH	0.0	0.0	0.0	0.0	-128,877		0	0	0	0	0	-128,877
Totals		101.9	0.0	0.0	101.9	-1,637,667		0	0	0	0	0	-1,637,667

The building peaked at hour 16 month 7 with a capacity of 101.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	Sq Ft	Sq Ft	
1 Main	UV	UV	14.71	2.19	425.7	194.1	61.82	2.19	-76.47		14,074	
2 Main	SZ	SZ	20.00	3.41	572.0	167.6	71.58	3.41	-87.64		4,935	
3 Main	UH	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87		3,593	

System 1 Block UV - UNIT VENTILATOR

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,226		90,481	10.40	*	44,331	7.97	*	-38,497	-71,861	6.99
Glass Solar	195,227	0		195,227	22.44	*	212,025	38.11	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.19	*	26,479	4.76	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,413		180,375	20.73	*	165,455	29.74	*	-490,481	-574,084	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.67	*	55,492	9.98	*	-247,207	-247,207	24.06
Sub Total=>	560,723	69,638		630,361	72.45	*	503,957	90.59	*	-910,391	-1,027,359	100.00
Internal Loads					*	*			*			
Lights	28,035	0		28,035	3.22	*	23,168	4.16	*	0	0	0.00
People	49,545			49,545	5.69	*	20,293	3.65	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total=>	77,580	0	0	77,580	8.92	*	43,461	7.81	*	0	0	0.00
Ceiling Load	10,372	-10,372		0	0.00	*	8,887	1.60	*	-12,139	0	0.00
Outside Air	0	0	0	174,382	20.04	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,584	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	-18,898	0	-18,898	-2.17	*		0.00	*		0	0	0.00
Terminal Bypass	0	0	0	-0.00	*		0.00	*		0	0	0.00
Grand Total=>	648,674	40,368	0	870,008	100.00	*	556,305	100.00	*	-922,530	-1,027,359	100.00

-COOLING COIL SELECTION-

COOLING COIL SELECTION								AREAS OF OPERATION			
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)
Main Clg	72.5	870.0	670.2	30,864	80.6	65.3	71.2	58.3	56.1	65.5	Floor Part 14,074 350
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr 0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof 15,978 0 0
Totals	72.5	870.0									Wall 12,830 3,646 28

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil (cfm)	Airfl Ent	Deg F	Lvg Deg F	Type Vent	Cooling 4,541	Heating 0	Clg % OA Clg Cfm/Sqft	14.7 2.19	Type SADB	Clg 58.4	Htg 95.5
Main Htg	-1,076.3	30,864	63.4	95.5	Infil		3,550	3,550	Clg Cfm/Ton	425.70	Plenum	78.8	59.0
Aux Htg	0.0	0	0.0	0.0	Supply		30,864	30,864	Clg Sqft/Ton	194.12	Return	78.8	63.8
Preheat	-0.0	30,864	62.1	58.2	Mincfm		0	0	Clg BtuH/Sqft	61.82	Ret/OA	80.5	63.8
Reheat	0.0	0	0.0	0.0	Return		30,864	30,864	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust		4,541	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh		0	0	Htg Cfm/SqFt	2.19	Fn BldTD	0.0	0.0
Total	-1,076.3				Auxil		0	0	Htg BtuH/SqFt	-76.47	Fn Frict	0.1	0.0

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/12 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1
 Outside Air ==> OADB/W3/HR: 87/ 72/ 98.0 * OADB: 89 * OADB: 4

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0		30,496	8.63	*	44,331	16.20	*	-38,497	-38,497	8.90
Glass Solar	75,357	0		75,357	21.33	*	117,002	42.76	*	0	0	0.00
Glass Cond	10,550	0		10,550	2.99	*	14,326	5.24	*	-72,739	-72,739	16.82
Wall Cond	42,873	0		42,873	12.14	*	72,429	26.47	*	-207,867	-207,867	48.06
Partition	175			175	0.05	*	175	0.06	*	-455	-455	0.11
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	55,749			55,749	15.78	*	25,058	9.16	*	-112,938	-112,938	26.11
Sub Total==>	215,200	0		215,200	60.92	*	273,320	99.88	*	-432,496	-432,496	100.00
Internal Loads					*		*	*				
Lights	4,548	0		4,548	1.29	*	168	0.06	*	0	0	0.00
People	10,542			10,542	2.98	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.27	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				7,185	2.03	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*		0.00	*		0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*		0	0.00
					*			*				
Grand Total==>	230,290	0	0	353,258	100.00	*	273,643	100.00	*	-432,496	-432,496	100.00

-COOLING COIL SELECTION

-----AREAS

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil (cfm)	Airfl Deg F	Ent Deg F	Lvg Vent	Type	Cooling 3,368	Heating 0	Clg % OA Clg Cfm/Sqft	20.0 3.41	Type SADB	Clg 60.1	Htg 91.6
Main Htg	-432.5	16,839	68.0	91.6	Infil		1,622	1,622	Clg Cfm/Ton	572.02	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply		16,839	16,839	Clg Sqft/Ton	167.64	Return	75.0	68.0
Preheat	-0.0	16,839	68.0	59.7	Mincfm		0	0	Clg Btuh/Sqft	71.58	Ret/OA	77.4	68.0
Reheat	0.0	0	0.0	0.0	Return		16,839	16,839	No. People	70	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust		3,368	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh		0	0	Htg Cfm/SqFt	3.41	Fn BldTD	0.1	0.0
Total	-432.5				Auxil		0	0	Htg Btuh/SqFt	-87.64	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

--ENGINEERING CHECKS--

--TEMPERATURES (F)--

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****			
Peaked at Time ==> Mo/Hr: 0/ 0						*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1	
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0						*	OADB: 0			*	OADB: 4	
Envelope Loads	Space Sens. + Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total ==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total ==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*		0.00
Ret. Fan Heat			0	0	0.00	*			0.00	*		0.00
Duct Heat Pkup			0	0	0.00	*			0.00	*		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat			0	0	0.00	*			0.00	*		0.00
Terminal Bypass			0	0	0.00	*			0.00	*		0.00
Grand Total ==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

COOLING COIL SELECTION

Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Total	Gross Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	Roof	3,593
Totals	0.0	0.0		0	0.0	0.0	0.0	Wall	2,000

HEATING COIL SELECTION

Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	0.0	Type	Clg	Htg	
Main Htg	-128.9	2,078	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,078	Clg Cfm/Ton	0.00	Plenum	0.0	43.2
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	2,078	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-128.9				Auxil	0	0	Htg Cfm/SqFt	0.58	Fn BldTD	0.0	0.0
						0	Htg Btuh/SqFt	-35.87	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values						Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
			Summer		Wintr		Summer		Wintr			
			ExFlr	Skylt	Skylt	Roof	Windo	Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	-0.057	0.560	0.573	1.000	0.297	76.1	16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
5	CLASS RM	0.000	0.000	0.003	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System	1 Total/Ave.	0.100	0.000	0.030	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46

BUILDING AREAS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- BUILDING AREAS -----

Room Number	Description	Floor Dupl	Floor	Total	Exposed	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
			Area/Dupl	Floor Area (sqft)	Partition Area (sqft)			
1	CHAPLIN-CLASS RM	1 1	1,700	1,700	0	0	0	1,950
2	SM CHAPEL-CLASS	1 1	2,274	2,274	0	0	0	2,550
3	ASSEMBLY	1 1	2,063	2,063	0	0	0	1,892
Zone	1 Total/Ave.			6,037	0	0	0	6,392
4	NAVE	1 1	4,935	4,935	350	0	0	5,356
Zone	2 Total/Ave.			4,935	350	0	0	5,356
5	CLASS RM	1 1	1,310	1,310	0	0	0	1,806
6	CLASS RM	1 1	1,664	1,664	0	0	0	2,226
7	VESTIBULE	1 1	128	128	0	0	0	198
Zone	3 Total/Ave.			3,102	0	0	0	4,230
System	1 Total/Ave.			14,074	350	0	0	15,978
4	NAVE	1 1	4,935	4,935	350	0	0	5,356
Zone	2 Total/Ave.			4,935	350	0	0	5,356
System	2 Total/Ave.			4,935	350	0	0	5,356
8	MECH RM-CORRIDOR	1 1	3,593	3,593	0	0	0	3,593
Zone	4 Total/Ave.			3,593	0	0	0	3,593
System	3 Total/Ave.			3,593	0	0	0	3,593
Building				22,602	700	0	0	24,927
						0	0	5,630
						0	0	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btu/h)	Hours	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.1	18	144	-81,883	46	1,202	2,489.0	53	3,372	0.0	0	0
5 - 10	10.2	28	224	-163,767	11	287	4,978.1	0	0	0.0	0	0
10 - 15	15.3	17	137	-245,650	6	145	7,467.1	0	0	0.0	0	0
15 - 20	20.4	6	51	-327,533	6	145	9,956.1	14	856	0.0	0	0
20 - 25	25.5	11	86	-409,417	1	26	12,445.1	18	1,160	0.0	0	0
25 - 30	30.6	5	38	-491,300	0	9	14,934.2	0	0	0.0	0	0
30 - 35	35.7	0	0	-573,183	15	384	17,423.2	0	0	0.0	0	0
35 - 40	40.8	0	0	-655,067	1	33	19,912.2	0	0	0.0	0	0
40 - 45	45.9	5	37	-736,950	0	0	22,401.2	0	0	0.0	0	0
45 - 50	51.0	0	0	-818,833	0	0	24,890.3	0	0	0.0	0	0
50 - 55	56.1	0	0	-900,717	2	47	27,379.3	0	0	0.0	0	0
55 - 60	61.2	1	8	-982,600	5	122	29,868.3	0	0	0.0	0	0
60 - 65	66.3	5	37	-1,064,484	3	70	32,357.3	0	0	0.0	0	0
65 - 70	71.4	5	40	-1,146,367	1	21	34,846.4	3	168	0.0	0	0
70 - 75	76.5	0	0	-1,228,250	0	8	37,335.4	4	266	0.0	0	0
75 - 80	81.6	0	0	-1,310,133	1	34	39,824.4	0	0	0.0	0	0
80 - 85	86.6	0	0	-1,392,017	1	20	42,313.4	0	0	0.0	0	0
85 - 90	91.7	0	0	-1,473,900	2	53	44,802.5	3	214	0.0	0	0
90 - 95	96.8	0	0	-1,555,784	0	0	47,291.5	5	290	0.0	0	0
95 - 100	101.9	0	0	-1,637,667	0	0	49,780.5	0	0	0.0	0	0
Hours Off	0.0	0	7,958	0	0	6,154	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- BUILDING TEMPERATURE PROFILES -----

Temperature	Zone Number				
Range (F)	1	2	3	2	4
Max. Temp.	88.9	97.8	99.0	98.0	91.3
Mo./Hr.	7 22	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1
					Number of Hours
Above 100	0	0	0	0	0
95 - 100	0	45	318	45	0
90 - 95	0	479	1,115	390	90
85 - 90	363	1,059	767	1,058	971
80 - 85	1,318	1,278	959	1,250	1,243
75 - 80	1,890	731	547	853	1,013
70 - 75	217	229	153	225	355
65 - 70	1,997	1,419	682	1,425	1,963
60 - 65	1,221	956	918	954	1,334
55 - 60	538	559	546	572	752
50 - 55	457	892	822	875	1,039
Below 50	759	1,113	1,933	1,113	0
Min. Temp.	36.5	38.4	36.5	38.5	54.9
Mo./Hr.	2 7	2 12	2 12	2 11	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Therm)	GAS DMND On Peak (Thrm/hr)
Jan	8,083	34	2,094	17
Feb	7,358	34	1,886	17
March	6,917	34	1,425	17
April	5,609	34	456	11
May	4,809	52	0	0
June	9,413	105	0	0
July	12,478	114	0	0
Aug	9,647	104	0	0
Sept	4,172	77	0	0
Oct	5,909	34	461	11
Nov	6,557	34	1,236	14
Dec	7,430	34	1,839	17
Total	88,382	114	9,397	17

Building Energy Consumption = 54,921 (Btu/Sq Ft/Year)
Source Energy Consumption = 83,805 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1 EQ2001	GAS FIRE TUBE HOT WATER												
GAS	2094	1886	1425	456	0	0	0	0	0	461	1236	1839	9,397
PK	17.0	17.0	16.6	11.1	0.0	0.0	0.0	0.0	0.0	11.2	14.0	17.0	17.0
1 EQ5020	HEAT WATER CIRC. PUMP C.V.												
ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	747	695	523	343	0	0	0	0	0	341	469	655	3,774
PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307	BOILER CONTROLS												
ELEC	207	192	145	95	0	0	0	0	0	94	130	182	1,046
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
REPLACE FLUORESCENT FIXTURES

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 113.8 (kW)
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eq.	Ref.	Equipment	Utility Demand (kW)	Percent Of Tot (%)
	Num.	Code Name	Equipment Description	

Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	89.9	78.94
Sub Total			89.9	78.94
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.6	8.42
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.3	3.80
Sub Total			13.9	12.22
Sub Total			0.0	0.00

Miscellaneous

Lights	10.1	8.85
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	10.1	8.85
Grand Total	113.8	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 452

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 16: 6:30 2/ 3/94
Dataset Name: CB4528 .TM

AIRFLOW - ALTERNATIVE 3
COMBINED ECOS

----- SYSTEM SUMMARY -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 UV	UV	4,243	29,080	29,080	31,485	6,648	0	0
2 SZ	SZ	3,157	15,787	15,787	16,885	15,787	0	0
3 UH	UH	0	0	2,023	0	0	0	0
Totals		7,401	44,867	46,891	48,370	22,435	0	0

CAPACITY - ALTERNATIVE 3
COMBINED ECOS

----- SYSTEM SUMMARY -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 UV	UV	64.1	0.0	0.0	64.1	-967,144	0	0	0	0	0	0	-967,144
2 SZ	SZ	27.5	0.0	0.0	27.5	-385,578	0	0	0	0	0	0	-385,578
3 UH	UH	0.0	0.0	0.0	0.0	-125,512	0	0	0	0	0	0	-125,512
Totals		91.6	0.0	0.0	91.6	-1,478,235	0	0	0	0	0	0	-1,478,235

The building peaked at hour 16 month 7 with a capacity of 90.3 tons

ENGINEERING CHECKS - ALTERNATIVE 3
COMBINED ECOS

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	UV	UV	14.59	2.07	454.0	219.7	54.61	2.07	-68.72	14,074	
2 Main	SZ	SZ	20.00	3.20	573.7	179.3	66.91	3.20	-78.13	4,935	
3 Main	UH	UH	0.00	0.00	0.0	0.0	0.00	0.56	-34.93	3,593	

System 1 Block UV - UNIT VENTILATOR

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/16 * Mo/Hr: 7/16 * Mo/Hr: 13/ 1

Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 * OADB: 91 * OADB: 4 *

	Space Sens.+Lat. (BtuH)	Ret. Air Sensible (BtuH)	Ret. Air Latent (BtuH)	Net Total (BtuH)	Percent Of Tot (%)	*	Space Sensible (BtuH)	Percent Of Tot (%)	Space Peak Space Sens (BtuH)	Coil Peak Tot Sens (BtuH)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	33,525	19,776		53,302	6.93	*	32,475	6.45	*	-28,011	-43,802
Glass Solar	194,827	0		194,827	25.35	*	218,109	43.33	*	0	0.00
Glass Cond	27,782	0		27,782	3.61	*	26,077	5.18	*	-133,751	-133,751
Wall Cond	140,644	24,216		164,860	21.45	*	140,606	27.94	*	-490,481	-575,287
Partition	175			175	0.02	*	175	0.03	*	-455	-455
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	92,345			92,345	12.01	*	37,066	7.36	*	-167,463	-167,463
Sub Total==>	489,299	43,993		533,292	69.38	*	454,508	90.30	*	-820,161	-920,758
Internal Loads						*					
Lights	27,866	0		27,866	3.63	*	22,757	4.52	*	0	0.00
People	49,413			49,413	6.43	*	20,086	3.99	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	77,279	0	0	77,279	10.05	*	42,843	8.51	*	0	0.00
Ceiling Load	6,538	-6,538		0	0.00	*	5,966	1.19	*	-10,628	0.00
Outside Air	0	0	0	162,971	21.20	*	0	0.00	*	0	0.00
Sup. Fan Heat				6,204	0.81	*		0.00	*		0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat		-11,132	0	-11,132	-1.45	*		0.00	*		0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0.00
Grand Total==>	573,115	26,323	0	768,613	100.00	*	503,317	100.00	*	-830,789	-920,758
						*					100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR		Gross Total Floor	Glass (sf) (%)
Main Clg	64.1	768.6	599.8	29,080	79.4 64.9 71.1	59.0 56.3 65.0	Part	350
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	15,978
Totals	64.1	768.6					Wall	12,830
								3,646 28

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating Infil	Clg % OA 0	14.6	Type	Clg	Htg
Main Htg	-967.1	29,080	63.7	94.3	Infil	4,243	0	Clg Cfm/Sqft	2.07	SADB	59.1	94.3
Aux Htg	0.0	0	0.0	0.0	Supply	2,404	2,404	Clg Cfm/Ton	454.02	Plenum	77.4	59.8
Preheat	-0.0	29,080	62.4	58.9	Mincfm	29,080	29,080	Clg Sqft/Ton	219.73	Return	77.4	64.1
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	54.61	Ret/OA	79.3	64.1
Humidif	0.0	0	0.0	0.0	Exhaust	4,243	0	No. People	198	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-967.1				Auxil	0	0	Htg Cfm/SqFt	2.07	Fn BldTD	0.0	0.0
						0	0	Htg Btuh/SqFt	-68.72	Fn Frict	0.1	0.0

System 2 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 7/12 * Mo/Hr: 7/17 * Mo/Hr: 13/ 1
Outside Air ==> DADB/WB/HR: 87/ 72/ 98.0 * DADB: 89 * DADB: 4
* *

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	21,096	0		21,096	6.39	*	32,475	13.33	*	-28,011	-28,011	7.26
Glass Solar	75,357	0		75,357	22.82	*	117,002	48.02	*	0	0	0.00
Glass Cond	10,550	0		10,550	3.19	*	14,326	5.88	*	-72,739	-72,739	18.87
Wall Cond	54,890	0		54,890	16.62	*	62,360	25.60	*	-207,867	-207,867	53.91
Partition	175			175	0.05	*	175	0.07	*	-455	-455	0.12
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	37,766			37,766	11.44	*	16,975	6.97	*	-76,506	-76,506	19.84
Sub Total==>	199,833	0		199,833	60.52	*	243,312	99.87	*	-385,578	-385,578	100.00
Internal Loads						*			*			
Lights	4,548	0		4,548	1.38	*	168	0.07	*	0	0	0.00
People	10,542			10,542	3.19	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.57	*	322	0.13	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	108,547	32.87	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,736	2.04	*		0.00	*			0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*			0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*			0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*			0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*			0.00
Grand Total==>	214,923	0	0	330,206	100.00	*	243,635	100.00	*	-385,578	-385,578	100.00

-COOLING COIL SELECTION-

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR		Gross Total Floor	Glass (sf) (%)				
Main Clg	27.5	330.2	231.5	15,787	77.4	64.5	72.8	60.4	57.8	69.2	Part	350
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	5,356
Totals	27.5	330.2									Wall	5,231
												0 0

-HEATING COIL SELECTION-

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
Main Htg	-385.6	15,787	68.0	90.4	Infil	3,157	0	Clg Cfm/Sqft	3.20	SADB	60.8	90.4
Aux Htg	0.0	0	0.0	0.0	Supply	1,099	1,099	Clg Cfm/Ton	573.71	Plenum	75.0	68.0
Preheat	-0.0	15,787	68.0	60.4	Mincfm	15,787	0	Clg Sqft/Ton	179.34	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	15,787	Clg Btuh/Sqft	66.91	Ret/OA	77.4	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,157	0	No. People	70	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-385.6				Auxil	0	0	Htg Cfm/SqFt	3.20	Fn BldTD	0.1	0.0
						0	0	Htg Btuh/SqFt	-78.13	Fn Frict	0.2	0.0

-AREAS-

	Gross Total Floor	Glass (sf) (%)
Part	4,935	
ExFlr	0	
Roof	5,356	0 0
Wall	5,231	1,983 38

--TEMPERATURES (F)--

	Type	Clg	Htg
SADB	60.8	90.4	
Plenum	75.0	68.0	
Return	75.0	68.0	
Ret/OA	77.4	68.0	
Runarnd	75.0	68.0	
Fn MtrTD	0.1	0.0	
Fn BldTD	0.1	0.0	
Fn Frict	0.2	0.0	

BUILDING U-VALUES - ALTERNATIVE 3
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values						Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)	
			Summr Skylt		Wintr Skylt		Summr Roof Windo		Wintr Windo		
			ExFlr	Summr Roof	Wintr Windo	Wall	Ceil.				
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	84.0 18.30
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.5 16.69
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.9 16.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	78.7 17.12
	4 NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6 17.28
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6 17.28
	5 CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	82.3 18.08
	6 CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	85.6 18.75
	7 VESTIBULE	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	63.1 14.15
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	83.2 18.28
System	1 Total/Ave.	0.100	0.000	0.000	0.000	0.045	0.560	0.573	1.000	0.297	79.7 17.43
	4 NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6 17.28
Zone	2 Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6 17.28
System	2 Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6 17.28
	8 MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3 16.07
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3 16.07
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3 16.07
Building		0.100	0.000	0.000	0.000	0.052	0.560	0.573	1.000	0.297	78.4 17.18

BUILDING AREAS - ALTERNATIVE 3

COMBINED ECOS

----- BUILDING AREAS -----

Room Number	Description	Floor Area/Dupl		Total Floor Area	Total Partition Area	Exposed Floor Area	Skylight Area	Skl /Rf (%)	Net Roof Area	Window Area	Win /Wl (%)	Net Wall Area
		Duplicate Flr	Rm	(sqft)	(sqft)	(sqft)	(sqft)	(%)	(sqft)	(sqft)	(%)	(sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.			6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	198	192	80	48
Zone	3 Total/Ave.			3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.			14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.			3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.			3,593	0	0	0	0	3,593	0	0	2,000
Building				22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 3

COMBINED ECOS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.052 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.420 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 3.35 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 49.04 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	4.6	22	199	-73,912	49	1,265	2,344.5	53	3,372	0.0	0	0
5 - 10	9.2	23	208	-147,823	7	190	4,689.1	0	0	0.0	0	0
10 - 15	13.7	12	109	-221,735	6	157	7,033.6	0	0	0.0	0	0
15 - 20	18.3	10	93	-295,647	5	140	9,378.1	14	856	0.0	0	0
20 - 25	22.9	11	101	-369,559	2	45	11,722.6	18	1,160	0.0	0	0
25 - 30	27.5	5	46	-443,470	0	4	14,067.2	0	0	0.0	0	0
30 - 35	32.0	4	36	-517,382	15	390	16,411.7	0	0	0.0	0	0
35 - 40	36.6	0	4	-591,294	0	0	18,756.2	0	0	0.0	0	0
40 - 45	41.2	0	4	-665,206	0	6	21,100.8	0	0	0.0	0	0
45 - 50	45.8	0	0	-739,117	0	0	23,445.3	0	0	0.0	0	0
50 - 55	50.4	0	0	-813,029	3	89	25,789.8	0	0	0.0	0	0
55 - 60	54.9	0	0	-886,941	4	112	28,134.3	0	0	0.0	0	0
60 - 65	59.5	2	22	-960,853	2	42	30,478.9	0	0	0.0	0	0
65 - 70	64.1	7	60	-1,034,764	1	17	32,823.4	3	168	0.0	0	0
70 - 75	68.7	2	15	-1,108,676	0	4	35,167.9	4	266	0.0	0	0
75 - 80	73.3	2	20	-1,182,588	2	54	37,512.5	0	0	0.0	0	0
80 - 85	77.8	0	0	-1,256,500	1	37	39,857.0	0	0	0.0	0	0
85 - 90	82.4	1	5	-1,330,411	1	20	42,201.5	8	504	0.0	0	0
90 - 95	87.0	0	0	-1,404,323	0	0	44,546.0	0	0	0.0	0	0
95 - 100	91.6	0	0	-1,478,235	0	0	46,890.6	0	0	0.0	0	0
Hours Off	0.0	0	7,838	0	0	6,188	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	1	2	3	2	4	Zone Number
Max. Temp.	88.7	97.2	98.5	97.4	89.5	
Mo./Hr.	7 21	7 23	7 23	7 23	7 24	
Day Type	4	1	1	1	1	
						Number of Hours
Above 100	0	0	0	0	0	
95 - 100	0	45	408	45	0	
90 - 95	0	550	1,244	440	0	
85 - 90	319	1,056	820	1,026	972	
80 - 85	1,303	1,359	813	1,395	1,316	
75 - 80	2,050	669	438	773	1,001	
70 - 75	150	175	340	175	383	
65 - 70	1,942	1,480	535	1,485	1,939	
60 - 65	1,286	950	928	945	1,473	
55 - 60	599	636	553	642	712	
50 - 55	445	927	946	921	964	
Below 50	666	913	1,735	913	0	
Min. Temp.	37.6	39.5	37.7	39.5	54.9	
Mo./Hr.	2 7	2 6	2 12	2 6	2 8	
Day Type	5	4	4	4	3	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Therm)	GAS DMND On Peak (Thrm/hr)
Jan	8,099	33	1,911	15
Feb	7,366	33	1,718	15
March	6,818	33	1,280	15
April	5,311	33	310	10
May	5,661	61	0	0
June	9,950	100	0	0
July	12,337	114	0	0
Aug	10,197	100	0	0
Sept	5,009	87	0	0
Oct	5,594	33	288	10
Nov	6,523	33	1,101	13
Dec	7,264	33	1,693	15
Total	90,128	114	8,300	15

Building Energy Consumption = 50,330 (Btu/Sq Ft/Year)
Source Energy Consumption = 79,487 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3 COMBINED ECOS

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
COMBINED ECOS

	ELEC	341	296	300	304	320	292	332	300	304	320	361	332	3,803	
	PK	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	
1	EQ2001	GAS FIRE TUBE HOT WATER													
	GAS	1911	1718	1280	310	0	0	0	0	0	288	1101	1693	8,300	
	PK	15.3	15.3	15.0	10.1	0.0	0.0	0.0	0.0	0.0	10.0	13.2	15.3	15.3	
1	EQ5020	HEAT WATER CIRC. PUMP C.V.													
	ELEC	3177	2946	2163	1260	0	0	0	0	0	1245	1991	2655	15,436	
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	
1	EQ5240	BOILER FORCED DRAFT FAN													
	ELEC	769	713	523	305	0	0	0	0	0	301	482	643	3,736	
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8	
1	EQ5307	BOILER CONTROLS													
	ELEC	213	198	145	84	0	0	0	0	0	84	133	178	1,035	
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 113.6 (kW)
Yearly Time of Peak 11 (hr) 7 (mo)

Hour 11 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	90.3	79.49
Sub Total			90.3	79.49
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND	9.0	7.90	
2	SUMMATION OF FAN ELECTRICAL DEMAND	4.1	3.57	
Sub Total			13.0	11.46
Sub Total			0.0	0.00

Miscellaneous

Lights	10.3	9.04
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	10.3	9.04
Grand Total	113.6	100.00

Building 901

Trace Input File

933702

CONTENTS OF : E:\CB901.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 901
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/BASE BUILDING
13 20/1/1/LOCKER & MAINTNC/736/1/2/0///9.3
14 20/2/1/CART MAINTENANCE/1000/1/2/0///8.6
15 20/3/1/LOCKER ROOM/714/1/2/0///9.3
16 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
17 20/5/2/NEW PRO SHOP/600/1/2/0///8.6
18 20/6/2/LOUNGE/1308/1/2/0//11
19 20/7/3/TOILETS, LOCKERS/775/1/2/0///10
20 20/8/4/OFFICE/145/1/2/0//9.3
21 20/9/5/STAIRS/169/1/2/0//20
22 21/M///CBGHTX///CBGHTX
23 22/2/1/YES///192
24 22/5/1/YES///192
25 22/6/1/NO/41/16//193/270/72
26 22/6/2/NO/41/16//193/90/72
27 22/7/1/YES///154
28 22/9/1/YES///154
29 24/1/1/32/8.5//139/90
30 24/1/2/23/8.5//139/180
31 24/2/1/37/7//194/0
32 24/2/2/27/7//194/90
33 24/3/1/15/8.5//139/270
34 24/4/1/11/8.5//195/270
35 24/5/1/19/7.25//196/270
36 24/5/2/30/7.25//196/0
37 24/6/1/31/11//197/180
38 24/6/2/41/9//197/270
39 24/6/3/30/11//197/0
40 24/7/1/23/8.5//139/0
41 24/7/2/32/8.5//139/90
42 24/7/3/26/8.5//139/180
43 25/1/1/3.5/2/2/.81/.64
44 25/2/1/3.5/1.2/4/.81/.64
45 25/3/1/3.5/2/2/.81/.64
46 25/4/1/15.75/1/1/.81/.64
47 25/5/2/81/1/1/.81/.64
48 25/6/1/42.7/1/1/.81/.64
49 25/6/2/17.4/1/4/.81/.64
50 25/6/3/195/1/1/1.04/.95
51 25/7/1/28.6/1/1/.81/.64
52 25/7/2/3.5/1.75/2/.81/.64
53 25/7/3/3.5/1.75/2/.81/.64
54 26/M/CBGHP&L/CBGHP&L/0FF//0FF/CBGHCLG/CBGHHTG/0FF/CBGHP&L/0FF
55 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
56 29/1////////1.16/CFM-SF
57 29/2////////1.16/CFM-SF
58 29/3////////.45/CFM-SF

CONTENTS OF : E:\CB901.TM

LINE # -----

59 29/4/////.45/CFM-SF/.45/CFM-SF
60 29/5/////.45/CFM-SF/.45/CFM-SF
61 29/6////1.16/CFM-SF/1.16/CFM-SF
62 29/7////////.45/CFM-SF
63 29/8/////.45/CFM-SF/.45/CFM-SF
64 29/9////////.45/CFM-SF
65 30/1///1086/CFM///1000/CFM
66 30/2///1200/CFM
67 30/3///315/CFM///700/CFM
68 30/4/1.11/CFM-SF
69 30/5/1.11/CFM-SF
70 30/6/2000/CFM
71 30/7
72 30/8/150/CFM
73 30/9///600/CFM
74 31/3/1/44/8.5//198/PRORATED
75 SYSTEM - 1
76 39/1/BASE BUILDING
77 40/1/SZ
78 41/1/2/2/4/4
79 42/1/.15
80 45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
81 40/2/RAD
82 41/2/2/3
83 42/2
84 45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
85 40/3/UH
86 41/3/1/1/5/5
87 42/3//.1///.125
88 45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
89 EQUIPMENT - 1
90 59/1/CARLISLE///BASE BUILDING
91 60/1/1/PKPLANT/1/1
92 62/1/EQ1161/3/39/MBH
93 65/1/1//2/3
94 67/1/EQ2005/1/.17/HP
95 69/1/EQ4003
96 69/2
97 69/3
98 LOAD - 2
99 19/2/WALL & ROOF INSULATION
100 20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
101 20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
102 20/3/1/LOCKER ROOM/714/1/2/0//9.3
103 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
104 20/5/2/NEW PRO SHOP/600/1/2/0//8.6
105 20/6/2/LOUNGE/1308/1/2/0//11
106 20/7/3/TOILETS, LOCKERS/775/1/2/0//10
107 20/8/4/OFFICE/145/1/2/0//9.3
108 20/9/5/STAIRS/169/1/2/0//20
109 21/M///CBGHTX///CBGHTX
110 22/2/1/YES///192
111 22/5/1/YES///192
112 22/6/1/NO/41/16//120/270/72
113 22/6/2/NO/41/16//120/90/72
114 22/7/1/YES///162
115 22/9/1/YES///162
116 24/1/1/32/8.5//121/90

CONTENTS OF : E:\CB901.TM

LINE # -----
117 24/1/2/23/8.5//121/180
118 24/2/1/37/7//194/0
119 24/2/2/27/7//194/90
120 24/3/1/15/8.5//121/270
121 24/4/1/11/8.5//122/270
122 24/5/1/19/7.25//123/270
123 24/5/2/30/7.25//123/0
124 24/6/1/31/11//124/180
125 24/6/2/41/9//124/270
126 24/6/3/30/11//124/0
127 24/7/1/23/8.5//121/0
128 24/7/2/32/8.5//121/90
129 24/7/3/26/8.5//121/180
130 25/1/1/3.5/2/2/.81/.64
131 25/2/1/3.5/1.2/4/.81/.64
132 25/3/1/3.5/2/2/.81/.64
133 25/4/1/15.75/1/1/.81/.64
134 25/5/2/81/1/1/.81/.64
135 25/6/1/42.7/1/1/.81/.64
136 25/6/2/17.4/1/4/.81/.64
137 25/6/3/195/1/1/1.04/.95
138 25/7/1/28.6/1/1/.81/.64
139 25/7/2/3.5/1.75/2/.81/.64
140 25/7/3/3.5/1.75/2/.81/.64
141 26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF
142 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
143 29/////////1.05/CFM-SF
144 29/2/////////1.05/CFM-SF
145 29/3////////.41/CFM-SF
146 29/4////////.41/CFM-SF/.41/CFM-SF
147 29/5////////.41/CFM-SF/.41/CFM-SF
148 29/6////////1.05/CFM-SF/1.05/CFM-SF
149 29/7////////.41/CFM-SF
150 29/8////////.41/CFM-SF/.41/CFM-SF
151 29/9////////.41/CFM-SF
152 30/1///1086/CFM///1000/CFM
153 30/2///1200/CFM
154 30/3///315/CFM///700/CFM
155 30/4/1.11/CFM-SF
156 30/5/1.11/CFM-SF
157 30/6/2000/CFM
158 30/7
159 30/8/150/CFM
160 30/9///600/CFM
161 31/3/1/44/8.5//198/PRORATED
162 SYSTEM - 2
163 39/2/WALL & ROOF INSULATION
164 40/1/SZ
165 41/1/2/2/4/4
166 42/1/.15
167 45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
168 40/2/RAD
169 41/2/2/3
170 42/2
171 45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
172 40/3/UH
173 41/3/1/1/5/5
174 42/3//.1///.125

CONTENTS OF : E:\CB901.TM

LINE # -----
175 45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
176 EQUIPMENT - 2
177 59/2/CARLISLE///WALL & ROOF INSULATION
178 60/1/1/PKPLANT/1/1
179 62/1/EQ1161/3/39/MBH
180 65/1/1//2/3
181 67/1/EQ2005/1/.17/HP
182 69/1/EQ4003
183 69/2
184 69/3
185 LOAD - 3
186 19/3/DOUBLE GLAZED WINDOWS
187 20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
188 20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
189 20/3/1/LOCKER ROOM/714/1/2/0//9.3
190 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
191 20/5/2/NEW PRO SHOP/600/1/2/0//8.6
192 20/6/2/LOUNGE/1308/1/2/0//11
193 20/7/3/TOILETS, LOCKERS/775/1/2/0//10
194 20/8/4/OFFICE/145/1/2/0//9.3
195 20/9/5/STAIRS/169/1/2/0//20
196 21/M///CBGHTX///CBGHTX
197 22/2/1/YES///192
198 22/5/1/YES///192
199 22/6/1/NO/41/16//193/270/72
200 22/6/2/NO/41/16//193/90/72
201 22/7/1/YES///154
202 22/9/1/YES///154
203 24/1/1/32/8.5//139/90
204 24/1/2/23/8.5//139/180
205 24/2/1/37/7//194/0
206 24/2/2/27/7//194/90
207 24/3/1/15/8.5//139/270
208 24/4/1/11/8.5//195/270
209 24/5/1/19/7.25//196/270
210 24/5/2/30/7.25//196/0
211 24/6/1/31/11//197/180
212 24/6/2/41/9//197/270
213 24/6/3/30/11//197/0
214 24/7/1/23/8.5//139/0
215 24/7/2/32/8.5//139/90
216 24/7/3/26/8.5//139/180
217 25/1/1/3.5/2/2/.30/.55
218 25/2/1/3.5/1.2/4/.30/.55
219 25/3/1/3.5/2/2/.30/.55
220 25/4/1/15.75/1/1/.30/.55
221 25/5/2/81/1/1/.30/.55
222 25/6/1/42.7/1/1/.30/.55
223 25/6/2/17.4/1/4/.30/.55
224 25/6/3/195/1/1/.30/.55
225 25/7/1/28.6/1/1/.30/.55
226 25/7/2/3.5/1.75/2/.30/.55
227 25/7/3/3.5/1.75/2/.30/.55
228 26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF
229 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
230 29/1////////.970/CFM-SF
231 29/2////////.970/CFM-SF
232 29/3////////.38/CFM-SF

CONTENTS OF : E:\CB901.TM

LINE # -----

233 29/4//.38/CFM-SF/.38/CFM-SF
234 29/5//.38/CFM-SF/.38/CFM-SF
235 29/6//.970/CFM-SF/.970/CFM-SF
236 29/7//.38/CFM-SF
237 29/8//.38/CFM-SF/.38/CFM-SF
238 29/9//.38/CFM-SF
239 30/1///1086/CFM///1000/CFM
240 30/2///1200/CFM
241 30/3///315/CFM///700/CFM
242 30/4/1.11/CFM-SF
243 30/5/1.11/CFM-SF
244 30/6/2000/CFM
245 30/7
246 30/8/150/CFM
247 30/9///600/CFM
248 31/3/1/44/8.5//198/PRORATED
249 SYSTEM - 3
250 39/3/DOUBLE GLAZED WINDOWS
251 40/1/SZ
252 41/1/2/2/4/4
253 42/1/.15
254 45/1/CBGHCLG/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF/0FF
255 40/2/RAD
256 41/2/2/3
257 42/2
258 45/2/0FF/0FF/0FF/0FF/CBGHHTG/0FF/0FF/0FF/0FF
259 40/3/UH
260 41/3/1/1/5/5
261 42/3//.1///.125
262 45/3/0FF/0FF/0FF/0FF/CBGHHTG/0FF/0FF/0FF/0FF
263 EQUIPMENT - 3
264 59/3/CARLISLE///DOUBLE GLAZED WINDOWS
265 60/1/1/PKPLANT/1/1
266 62/1/EQ1161/3/39/MBH
267 65/1/1//2/3
268 67/1/EQ2005/1/.17/HP
269 69/1/EQ4003
270 69/2
271 69/3
272 LOAD - 4
273 19/4/WEATHERSTRIP & CAULKING
274 20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
275 20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
276 20/3/1/LOCKER ROOM/714/1/2/0//9.3
277 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
278 20/5/2/NEW PRO SHOP/600/1/2/0//8.6
279 20/6/2/LOUNGE/1308/1/2/0//11
280 20/7/3/TOILETS, LOCKERS/775/1/2/0//10
281 20/8/4/OFFICE/145/1/2/0//9.3
282 20/9/5/STAIRS/169/1/2/0//20
283 21/M///CBGHTX///CBGHTX
284 22/2/1/YES///192
285 22/5/1/YES///192
286 22/6/1/NO/41/16//193/270/72
287 22/6/2/NO/41/16//193/90/72
288 22/7/1/YES///154
289 22/9/1/YES///154
290 24/1/1/32/8.5//139/90

CONTENTS OF : E:\CB901.TM

LINE # -----
291 24/1/2/23/8.5//139/180
292 24/2/1/37/7//194/0
293 24/2/2/27/7//194/90
294 24/3/1/15/8.5//139/270
295 24/4/1/11/8.5//195/270
296 24/5/1/19/7.25//196/270
297 24/5/2/30/7.25//196/0
298 24/6/1/31/11//197/180
299 24/6/2/41/9//197/270
300 24/6/3/30/11//197/0
301 24/7/1/23/8.5//139/0
302 24/7/2/32/8.5//139/90
303 24/7/3/26/8.5//139/180
304 25/1/1/3.5/2/2/.81/.64
305 25/2/1/3.5/1.2/4/.81/.64
306 25/3/1/3.5/2/2/.81/.64
307 25/4/1/15.75/1/1/.81/.64
308 25/5/2/81/1/1/.81/.64
309 25/6/1/42.7/1/1/.81/.64
310 25/6/2/17.4/1/4/.81/.64
311 25/6/3/195/1/1/1.04/.95
312 25/7/1/28.6/1/1/.81/.64
313 25/7/2/3.5/1.75/2/.81/.64
314 25/7/3/3.5/1.75/2/.81/.64
315 26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF
316 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
317 29/1////////.770/CFM-SF
318 29/2////////.770/CFM-SF
319 29/3////////.30/CFM-SF
320 29/4////////.30/CFM-SF/.30/CFM-SF
321 29/5////////.30/CFM-SF/.30/CFM-SF
322 29/6////////.770/CFM-SF/.770/CFM-SF
323 29/7////////.30/CFM-SF
324 29/8////////.30/CFM-SF/.30/CFM-SF
325 29/9////////.30/CFM-SF
326 30/1///1086/CFM////1000/CFM
327 30/2///1200/CFM
328 30/3///315/CFM////700/CFM
329 30/4/1.11/CFM-SF
330 30/5/1.11/CFM-SF
331 30/6/2000/CFM
332 30/7
333 30/8/150/CFM
334 30/9///600/CFM
335 31/3/1/44/8.5//198/PRORATED
336 SYSTEM - 4
337 39/4/WEATHERSTRIP & CAULKING
338 40/1/SZ
339 41/1/2/2/4/4
340 42/1/.15
341 45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
342 40/2/RAD
343 41/2/2/3
344 42/2
345 45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
346 40/3/UH
347 41/3/1/1/5/5
348 42/3///.1///.125

CONTENTS OF : E:\CB901.TM

LINE # -----
349 45/3/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
350 EQUIPMENT - 4
351 59/4/CARLISLE///WEATHERSTRIP & CAULKING
352 60/1/1/PKPLANT/1/1
353 62/1/EQ1161/3/39/MBH
354 65/1/1//2/3
355 67/1/EQ2005/1/.17/HP
356 69/1/EQ4003
357 69/2
358 69/3

CONTENTS OF : E:\CB901B.TM

LINE # -----

1 JOB - 1
2 01/ENERGY SAVINGS OPPORTUNITY STUDY
3 01/CARLISLE BARRACKS, PA
4 01/DEPARTMENT OF THE ARMY
5 01/BENATEC ASSOCIATES
6 01/BUILDING 901
7 08/CARLISLE
8 09/MAY/SEP///APR/OCT
9 10/CLTD-CLF
10 11///ZONE
11 LOAD - 1
12 19/1/COMBINED ECOS
13 20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
14 20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
15 20/3/1/LOCKER ROOM/714/1/2/0//9.3
16 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
17 20/5/2/NEW PRO SHOP/600/1/2/0//8.6
18 20/6/2/LOUNGE/1308/1/2/0//11
19 20/7/3/TOILETS, LOCKERS/775/1/2/0//10
20 20/8/4/OFFICE/145/1/2/0//9.3
21 20/9/5/STAIRS/169/1/2/0//20
22 21/M///CBGHTX///CBGHTX
23 22/2/1/YES///192
24 22/5/1/YES///192
25 22/6/1/NO/41/16//120/270/72
26 22/6/2/NO/41/16//120/90/72
27 22/7/1/YES///162
28 22/9/1/YES///162
29 24/1/1/32/8.5//121/90
30 24/1/2/23/8.5//121/180
31 24/2/1/37/7//194/0
32 24/2/2/27/7//194/90
33 24/3/1/15/8.5//121/270
34 24/4/1/11/8.5//122/270
35 24/5/1/19/7.25//123/270
36 24/5/2/30/7.25//123/0
37 24/6/1/31/11//124/180
38 24/6/2/41/9//124/270
39 24/6/3/30/11//124/0
40 24/7/1/23/8.5//121/0
41 24/7/2/32/8.5//121/90
42 24/7/3/26/8.5//121/180
43 25/1/1/3.5/2/2/.81/.64
44 25/2/1/3.5/1.2/4/.81/.64
45 25/3/1/3.5/2/2/.81/.64
46 25/4/1/15.75/1/1/.81/.64
47 25/5/2/81/1/1/.81/.64
48 25/6/1/42.7/1/1/.81/.64
49 25/6/2/17.4/1/4/.81/.64
50 25/6/3/195/1/1/1.04/.95
51 25/7/1/28.6/1/1/.81/.64
52 25/7/2/3.5/1.75/2/.81/.64
53 25/7/3/3.5/1.75/2/.81/.64
54 26/M/CBGHP&L/CBGHP&L/0FF//0FF/CBGHCLG/CBGHHTG/0FF/CBGHP&L/0FF
55 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
56 29/1////////.590/CFM-SF
57 29/2////////.590/CFM-SF
58 29/3////////.23/CFM-SF

CONTENTS OF : E:\CB901B.TM

LINE # -----

59 29/4////.23/CFM-SF/.23/CFM-SF
60 29/5////.23/CFM-SF/.23/CFM-SF
61 29/6////.590/CFM-SF/.590/CFM-SF
62 29/7////////.23/CFM-SF
63 29/8////.23/CFM-SF/.23/CFM-SF
64 29/9////////.23/CFM-SF
65 30/1///1086/CFM////1000/CFM
66 30/2///1200/CFM
67 30/3///315/CFM////700/CFM
68 30/4/1.11/CFM-SF
69 30/5/1.11/CFM-SF
70 30/6/2000/CFM
71 30/7
72 30/8/150/CFM
73 30/9///600/CFM
74 31/3/1/44/8.5//198/PRORATED
75 SYSTEM - 1
76 39/1/COMBINED ECOS
77 40/1/SZ
78 41/1/2/2/4/4
79 42/1/.15
80 45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
81 40/2/RAD
82 41/2/2/3
83 42/2
84 45/2/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF/OFF
85 40/3/UH
86 41/3/1/1/5/5
87 42/3///.1////.125
88 45/3/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF/OFF
89 EQUIPMENT - 1
90 59/1/CARLISLE///COMBINED ECOS
91 60/1/1/PKPLANT/1/1
92 62/1/EQ1161/3/39/MBH
93 65/1/1//2/3
94 67/1/EQ2005/1/.17/HP
95 69/1/EQ4003
96 69/2
97 69/3

Building 901

Trace Output File

933702

** **
** TRACE 600 ANALYSIS **
** **
** by **
** **

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 901

Weather File Code: CARLISLE
Location: ENERGY SAVINGS OPPORTUNITY STUDY
Latitude: 40.2 (deg)
Longitude: 77.2 (deg)
Time Zone: 5
Elevation: 475 (ft)
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00
Winter Clearness Number: 1.00
Summer Design Dry Bulb: 92 (F)
Summer Design Wet Bulb: 72 (F)
Winter Design Dry Bulb: 4 (F)
Summer Ground Relectance: 0.20
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)
Air Specific Heat: 0.2444 (Btu/lbm/F)
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 11:27: 9 1/17/94
Dataset Name: CB901 .TM

AIRFLOW - ALTERNATIVE 1
BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main				Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)		
1 SZ		0	3,248	3,357	4,765	1,408	0
2 RAD		0	0	0	0	1,718	0
3 UH		0	0	3,201	0	1,119	0
Totals		0	3,248	6,558	4,765	4,246	0

CAPACITY - ALTERNATIVE 1
BASE BUILDING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Opt. Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent Capacity (Btuh)
1 SZ		8.8	0.0	0.0	8.8	-200,649	0	0	0	0	0	0	-200,649
2 RAD		0.0	0.0	0.0	0.0	-197,443	0	0	0	0	0	0	-197,443
3 UH		0.0	0.0	0.0	0.0	-103,545	0	0	0	0	0	0	-103,545
Totals		8.8	0.0	0.0	8.8	-501,637	0	0	0	0	0	0	-501,637

The building peaked at hour 14 month 7 with a capacity of 8.8 tons

ENGINEERING CHECKS - ALTERNATIVE 1
BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating			
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft	
1 Main	SZ		0.00	1.33	367.3	276.2	43.45	1.37	-82.17	2,442	
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-64.27	3,072	
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.22	-39.54	2,619	

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
Peaked at Time ==> Mo/Hr: 7/14 * Mo/Hr: 7/15 * Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 * OADB: 91 * OADB: 4

	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	6,983	0		6,983	6.58	*	11,443	15.38	*	-14,585	-14,585	7.34
Glass Solar	11,853	0		11,853	11.17	*	14,618	19.64	*	0	0	0.00
Glass Cond	4,849	0		4,849	4.57	*	4,960	6.67	*	-24,753	-24,753	12.47
Wall Cond	6,730	27		6,756	6.37	*	10,410	13.99	*	-20,341	-20,455	10.30
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	59,314			59,314	55.90	*	22,158	29.77	*	-98,085	-98,085	49.40
Sub Total==>	89,728	27		89,755	84.59	*	63,590	85.45	*	-157,763	-157,877	79.51
Internal Loads					*			*				
Lights	11,334	0		11,334	10.68	*	8,954	12.03	*	0	0	0.00
People	4,560			4,560	4.30	*	1,791	2.41	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,893	0	0	15,893	14.98	*	10,745	14.44	*	0	0	0.00
Ceiling Load	222	-222		0	0.00	*	93	0.13	*	-453	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.44	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-6			-6	-0.01	*	-6	-0.01	*	-40,690	-40,690	20.49
Exhaust Heat	0	0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	105,837	-195	0	106,103	100.00	*	74,422	100.00	*	-198,906	-198,567	100.00

--COOLING COIL SELECTION

---ARFAS---

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil (cfm)	Airfl Ent Deg F	Lvg Deg F
Main Htg	-200.6	3,357	67.5	122.5
Aux Htg	0.0	0	0.0	0.0
Preheat	-0.0	3,248	67.5	53.8
Reheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-200.6			

-----AIRFLOWS (cfm)-----

Type	Cooling	Heating
Vent	0	
Infil	1,408	1,4
Supply	3,248	3,3
Mincfm	0	
Return	3,248	3,3
Exhaust	0	
Rm Exh	0	
Auxil	0	

--ENGINEERING CHECK

Clg % OA	
Clg Cfm/Sqft	1
Clg Cfm/Ton	367
Clg Sqft/Ton	276
Clg BtuH/Sqft	43
No. People	
Htg % OA	
Htg Cfm/SqFt	1
Htg BtuH/SqFt	-82

--TEMPERATURES (F)--

Type	Clg	Htg
SADB	53.9	122.5
Plenum	76.8	64.3
Return	75.2	67.5
Ret/OA	75.2	67.5
Runarnd	75.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****													
Peaked at Time ==>			Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1		
Outside Air ==>			OADB/WB/HR: 0/ 0/ 0.0			*	OADB: 0			*	OADB: 4		
						*				*			
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)		
Envelope Loads						*							
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Roof Cond	0	0		0	0.00	*	0	0.00	*	-17,425	-17,425	8.83	
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	13.98	
Wall Cond	0	0		0	0.00	*	0	0.00	*	-32,718	-32,756	16.59	
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00	
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00	
Infiltration	0			0	0.00	*	0	0.00	*	-119,663	-119,663	60.61	
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-197,406	-197,443	100.00	
Internal Loads						*			*				
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00	
People	0			0	0.00	*	0	0.00	*	0	0	0.00	
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,443	0	0.00	
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00	
Sup. Fan Heat				0	0.00	*			0.00	*		0.00	
Ret. Fan Heat				0	0.00	*			0.00	*		0.00	
Duct Heat Pkup				0	0.00	*			0.00	*		0.00	
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00	
Exhaust Heat	0	0		0	0.00	*			0.00	*		0.00	
Terminal Bypass	0	0		0	0.00	*			0.00	*		0.00	
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-202,849	-197,443	100.00	

COOLING COIL SELECTION										AREAS		
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(\\$)					
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	3,072						
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Part	0					
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0					
Totals	0.0	0.0				Roof	2,687	0	0			
						Wall	2,177	457	21			

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg
Main Htg	-197.4	0	0.0	Infil	0	1,718	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Plenum	0.0	23.8
Preheat	0.0	0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	No. People	0	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	Htg % DA	0.0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn MtrTD	0.0	0.0
Total	-197.4			Auxil	0	0	Htg Btuh/SqFt	-64.27	Fn BldTD	0.0	0.0
							Htg Frict	0.0	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****						HEATING COIL PEAK *****		
Peaked at Time ==>		Mo/Hr: 0/ 0		*		Mo/Hr: 0/ 0		*		Mo/Hr: 13/ 1				
Outside Air ==>		DADB/WB/HR: 0/ 0/ 0.0		*		DADB: 0		*		DADB: 4				
					*				*					
Envelope Loads	Sens. + Lat.	Space Sens. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Space Peak Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Skylite Solr		0	0		0	0.00	*	0	0.00	*	0	0	0	0.00
Skylite Cond		0	0		0	0.00	*	0	0.00	*	0	0	0	0.00
Roof Cond		0	0		0	0.00	*	0	0.00	*	-3,002	-3,002	2.90	
Glass Solar		0	0		0	0.00	*	0	0.00	*	0	0	0	0.00
Glass Cond		0	0		0	0.00	*	0	0.00	*	-2,402	-2,402	2.32	
Wall Cond		0	0		0	0.00	*	0	0.00	*	-20,183	-20,183	19.49	
Partition		0			0	0.00	*	0	0.00	*	0	0	0	0.00
Exposed Floor		0			0	0.00	*	0	0.00	*	0	0	0	0.00
Infiltration		0			0	0.00	*	0	0.00	*	0	0	0	0.00
Sub Total ==>		0	0		0	0.00	*	0	0.00	*	-77,958	-77,958	75.29	
Internal Loads							*				-103,545	-103,545		
Lights		0	0		0	0.00	*	0	0.00	*	0	0	0	0.00
People		0			0	0.00	*	0	0.00	*	0	0	0	0.00
Misc		0	0	0	0	0.00	*	0	0.00	*	0	0	0	0.00
Sub Total ==>		0	0	0	0	0.00	*	0	0.00	*	0	0	0	0.00
Ceiling Load		0	0		0	0.00	*	0	0.00	*	0	0	0	0.00
Outside Air		0	0		0	0.00	*	0	0.00	*	0	0	0	0.00
Sup. Fan Heat					0	0.00	*	0	0.00	*	0	0	0	0.00
Ret. Fan Heat					0	0.00	*				0.00	0	0.00	
Duct Heat Pkup					0	0.00	*				0.00	0	0.00	
OV/UNDR Sizing		0			0	0.00	*	0	0.00	*	0	0	0	0.00
Exhaust Heat					0	0.00	*	0	0.00	*	0	0	0	0.00
Terminal Bypass					0	0.00	*				0.00	0	0.00	
Grand Total ==>		0	0	0	0	0.00	*	0	0.00	*	-103,545	-103,545	100.00	

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering Deg F	DB/WB/HR	Leaving Deg F	DB/WB/HR	Gross Total	Areas Glass (sf) (\$)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Floor	2,619
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	374
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0
Totals	0.0	0.0		0	0.0	0.0	0.0	Roof	1,169
								Wall	1,043
									0 0
									45 4

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating Infil	Clg % OA	0.0	--ENGINEERING CHECKS--	Type	Clg	Htg
Main Htg	-103.5	3,201	68.0	97.7	Infil	0	1,119	Clg Cfm/Sqft	0.00	SADB	0.0	97.7	
Aux Htg	0.0	0	0.0	0.0	Supply	0	3,201	Clg Cfm/Ton	0.00	Plenum	0.0	68.0	
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0	
Reheat	0.0	0	0.0	0.0	Return	0	3,201	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-103.5		0.0	0.0	Auxil	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0	
								Htg Btuh/SqFt	-39.54	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 1
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)		
		Summr ExFlr		Wintr Skylt		Summr Roof		Wintr Windo					
		Part.	Skylt	Skylt	Windo	Windo	Wall	Ceil.					
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27	
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15	
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59	
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72	
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67	
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	36.3	9.30	
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27	
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15	
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59	
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72	
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38	
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38	
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.101	0.908	0.943	0.298	0.317	41.6	10.13	
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	36.7	7.35	
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83	
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	39.3	7.86	
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.316	0.000	40.1	8.10	
9	STAIRS	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15	
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15	
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.040	0.810	0.837	0.316	0.000	38.9	7.91	
Building		0.275	0.000	0.000	0.000	0.095	0.909	0.944	0.302	0.317	39.1	9.17	

BUILDING AREAS - ALTERNATIVE 1
BASE BUILDING

B U I L D I N G A R E A S

Room Number	Description	Floor		Total		Exposed		Skylight Area (sqft)	Skl /Rf (\$)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (\$)	Net Wall Area (sqft)
		Number of Duplicate	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Area (sqft)						
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.			2,297	0	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.			145	0	0	0	0	0	0	0	0	0
System	1 Total/Ave.			2,442	0	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.			2,297	0	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.			775	0	0	0	0	0	775	53	8	635
System	2 Total/Ave.			3,072	0	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.			2,450	374	0	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.			169	0	0	0	0	0	169	0	0	0
System	3 Total/Ave.			2,619	374	0	0	0	0	1,169	45	4	998
Building				8,133	374	0	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
BASE BUILDING

A S H R A E 9 0 A N A L Y S I S

Overall Roof U-Value = 0.095 (Btu/Hr/Sq Ft/F)
Overall Wall U-Value = 0.419 (Btu/Hr/Sq Ft/F)
Overall Building U-Value = 0.240 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.77 (Btu/Hr/Sq Ft)
Wall Overall Thermal Transfer Value (OTTVw) = 31.23 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours	Hours	Capacity (Btuh)	Hours	Hours	Cap. (Cfm)	Hours	Hours	Cap. (Cfm)	Hours	Hours
0 - 5	0.4	68	1,344	-25,082	11	306	327.9	0	0	0.0	0	0
5 - 10	0.9	2	31	-50,164	24	654	655.8	0	0	0.0	0	0
10 - 15	1.3	1	15	-75,246	23	631	983.7	0	0	0.0	0	0
15 - 20	1.8	1	15	-100,327	8	217	1,311.5	0	0	0.0	0	0
20 - 25	2.2	0	0	-125,409	8	219	1,639.4	0	0	0.0	0	0
25 - 30	2.7	0	0	-150,491	3	89	1,967.3	0	0	0.0	0	0
30 - 35	3.1	2	43	-175,573	2	44	2,295.2	0	0	0.0	0	0
35 - 40	3.5	3	61	-200,655	1	31	2,623.1	0	0	0.0	0	0
40 - 45	4.0	6	111	-225,737	2	45	2,951.0	0	0	0.0	0	0
45 - 50	4.4	8	152	-250,819	2	59	3,278.9	81	5,748	0.0	0	0
50 - 55	4.9	0	0	-275,901	1	30	3,606.7	19	1,329	0.0	0	0
55 - 60	5.3	8	155	-300,982	14	392	3,934.6	0	0	0.0	0	0
60 - 65	5.7	3	62	-326,064	0	0	4,262.5	0	0	0.0	0	0
65 - 70	6.2	0	0	-351,146	0	0	4,590.4	0	0	0.0	0	0
70 - 75	6.6	0	0	-376,228	0	0	4,918.3	0	0	0.0	0	0
75 - 80	7.1	0	0	-401,310	0	0	5,246.2	0	0	0.0	0	0
80 - 85	7.5	0	0	-426,392	0	0	5,574.1	0	0	0.0	0	0
85 - 90	8.0	0	0	-451,474	0	0	5,901.9	0	0	0.0	0	0
90 - 95	8.4	0	0	-476,556	0	0	6,229.8	0	0	0.0	0	0
95 - 100	8.8	0	0	-501,637	0	0	6,557.7	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,043	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	2	4	2	3	1	5	Zone Number
Max. Temp.	81.8	316.5	102.7	99.8	101.3	141.3	
Mo./Hr.	7	24	12	24	7	22	7 21
Day Type	1	5	1	1	1	1	1
							Number of Hours
Above 100	0	8,052	160	0	280	3,089	
95 - 100	0	28	1,034	812	1,454	99	
90 - 95	0	116	1,054	1,226	1,036	196	
85 - 90	0	104	741	761	403	90	
80 - 85	76	205	593	703	337	198	
75 - 80	2,464	136	90	170	162	0	
70 - 75	814	119	0	0	0	0	
65 - 70	318	0	2,232	2,439	2,581	5,088	
60 - 65	386	0	1,095	1,268	1,669	0	
55 - 60	920	0	678	727	692	0	
50 - 55	683	0	1,083	654	146	0	
Below 50	3,099	0	0	0	0	0	
Min. Temp.	30.5	68.0	54.9	54.9	54.9	67.3	
Mo./Hr.	2	9	1	1	4	7	1 8 2 6 1 6
Day Type	5	1	1	2	2	1	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	3,148	10	774
Feb	2,880	10	796
March	2,985	10	495
April	2,693	10	248
May	4,250	17	0
June	4,902	18	0
July	6,205	18	0
Aug	5,075	18	0
Sept	4,113	17	0
Oct	2,701	10	189
Nov	2,792	10	335
Dec	3,107	10	624
Total	44,852	18	3,461

Building Energy Consumption = 61,380 (Btu/Sq Ft/Year) Floor Area = 8,133 (Sq Ft)
Source Energy Consumption = 101,270 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1 BASE BUILDING

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
BASE BUILDING

ELEC	89	85	68	41	0	0	0	0	0	31	53	84	452
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240 BOILER FORCED DRAFT FAN													
ELEC	159	152	121	72	0	0	0	0	0	56	95	149	804
PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3
1 EQ5307 BOILER CONTROLS													
ELEC	263	252	201	120	0	0	0	0	0	93	158	248	1,336
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040 FUEL OIL PUMP C.V.													
ELEC	178	170	136	81	0	0	0	0	0	63	107	168	903
PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eq. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
---------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights	12.2	68.89
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	12.2	68.89
Grand Total	17.7	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 901

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Reflectance:	0.20
Winter Ground Reflectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September
System Simulation Period: January To December
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 11:40:24 1/17/94
Dataset Name: CB901 .TM

AIRFLOW - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main				Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)		
1 SZ		0	3,248	3,248	4,524	1,276	0
2 RAD		0	0	0	0	1,558	0
3 UH		0	0	3,201	0	1,014	0
Totals		0	3,248	6,449	4,524	3,848	0

CAPACITY - ALTERNATIVE 2
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	
1 SZ		6.4	0.0	0.0	6.4	-157,799	0	0	0	0	0	0	-157,799
2 RAD		0.0	0.0	0.0	0.0	-148,594	0	0	0	0	0	0	-148,594
3 UH		0.0	0.0	0.0	0.0	-86,922	0	0	0	0	0	0	-86,922
Totals		6.4	0.0	0.0	6.4	-393,316	0	0	0	0	0	0	-393,316

The building peaked at hour 14 month 7 with a capacity of 6.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	Floor Area Sq Ft		
1	Main	SZ	0.00	1.33	503.6	378.7	31.69	1.33	-64.62	2,442		
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-48.37	3,072		
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-33.19	2,619		

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 7/14			*	Mo/Hr: 7/15			*	Mo/Hr: 13/ 1		
Outside Air ==>	DADB/WB/HR: 91/ 74/105.0			*	DADB: 91			*	DADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak (Btu/h)	Coil Peak (Btu/h)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	1,640	0		1,640	2.12	*	1,994	3.49	*	-4,646	-4,646 2.96
Glass Solar	11,853	0		11,853	15.32	*	13,082	22.92	*	0	0.00
Glass Cond	4,849	0		4,849	6.27	*	5,137	9.00	*	-24,753	-24,753 15.76
Wall Cond	887	6		893	1.15	*	1,059	1.85	*	-3,889	-3,914 2.49
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	41,794			41,794	54.01	*	22,217	38.92	*	-88,867	-88,867 56.58
Sub Total==>	61,023	6		61,029	78.87	*	43,488	76.19	*	-122,155	-122,180 77.79
Internal Loads						*					
Lights	11,334	0		11,334	14.65	*	11,431	20.03	*	0	0.00
People	4,560			4,560	5.89	*	2,141	3.75	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	15,893	0	0	15,893	20.54	*	13,573	23.78	*	0	0.00
Ceiling Load	54	-54		0	0.00	*	21	0.04	*	-154	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				462	0.60	*		0.00	*		0.00
Ret. Fan Heat				0	0.00	*		0.00	*		0.00
Duct Heat Pkup				0	0.00	*		0.00	*		0.00
OV/UNDR Sizing	0			0	-0.00	*	0	-0.00	*	-34,885	-34,885 22.21
Exhaust Heat	0	0		0	0.00	*		0.00	*	0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*	0	0.00
Grand Total==>	76,971	-49	0	77,384	100.00	*	57,082	100.00	*	-157,194	-157,064 100.00

COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Areas	Glass (sf)	(\$)
Main Clg	6.4	77.4	54.7	3,248	75.1 65.6 82.1	58.7 58.1 73.4	Floor	2,442	
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	6.4	77.4					Roof	1,912	0 0
							Wall	1,489	404 27

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA 0	0.0	Type	Clg	Htg
Main Htg	-157.8	3,248	67.8	112.5	Infil	1,276	1,276	Clg Cfm/Sqft	1.33	SADB	58.8	112.5
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,248	Clg Cfm/Ton	503.64	Plenum	75.4	66.7
Preheat	-0.0	3,248	67.8	58.7	Mincfm	0	0	Clg Sqft/Ton	378.68	Return	75.1	67.8
Reheat	0.0	0	0.0	0.0	Return	3,248	3,248	Clg Btuh/Sqft	31.69	Ret/OA	75.1	67.8
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	1.33	Fn MtrTD	0.0	0.0
Total	-157.8				Auxil	0	0	Htg Btuh/SqFt	-64.62	Fn BldTD	0.0	0.0
								Htg Frict	0.1	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time => Mo/Hr: 0 / 0 * Mo/Hr: 0 / 0 * Mo/Hr: 13 / 1
 Outside Air => OADB/WB/HR: 0 / 0 / 0.0 * OADB: 0 * OADB: 4

	Space Sens.+Lat. (BtuH)	Ret. Air Sensible (BtuH)	Ret. Air Latent (BtuH)	Net Total (BtuH)	Percent (%)	*	Space Sensible (BtuH)	Percent (%)	*	Space Peak (BtuH)	Coil Peak (BtuH)	Percent (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-6,257	-6,257	4.21
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	18.57
Wall Cond	0	0		0	0.00	*	0	0.00	*	-6,197	-6,211	4.18
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-108,527	-108,527	73.04
Sub Total=>	0	0		0	0.00	*	0	0.00	*	-148,580	-148,594	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total=>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-3,497	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*				0.00	0	0.00
Ret. Fan Heat		0		0	0.00	*				0.00	0	0.00
Duct Heat Pkup		0		0	0.00	*				0.00	0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*				0.00	0	0.00
Terminal Bypass		0	0	0	0.00	*				0.00	0	0.00
Grand Total=>	0	0	0	0	0.00	*	0	0.00	*	-152,078	-148,594	100.00

COOLING COIL SELECTION-----							AREAS-----			
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Leaving DB/WB/HR	Deg F	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Exflr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	Roof	2,687	0 0
Totals	0.0	0.0						Wall	2,177	457 21

HEATING COIL SELECTION-----				AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg	
Main Htg	-148.6	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,558	Clg Cfm/Ton	0.00	Plenum	0.0	39.6
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-148.6			Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0	
				Auxil	0	0	Htg Btuh/SqFt	-48.37	Fn Frict	0.0	0.0	

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****

Peaked at Time ==> Mo/Hr: 0/ 0 * Mo/Hr: 0/ 0 * Mo/Hr: 13/ 1
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 * OADB: 0 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-2,734	-2,734	3.14
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-2,402	-2,402	2.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-11,197	-11,197	12.88
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-70,589	-70,589	81.21
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-86,922	-86,922	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*				0.00		0.00
Ret. Fan Heat		0		0	0.00	*				0.00		0.00
Duct Heat Pkup		0		0	0.00	*				0.00		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*				0.00		0.00
Terminal Bypass	0	0		0	0.00	*				0.00		0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-86,922	-86,922	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(\\$)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	Floor 2,619		
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	Part 374		
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	ExFlr 0		
Totals	0.0	0.0				Roof 1,169 0 0		
						Wall 1,043 45 4		

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg
Main Htg	-86.9	3,201	68.0	93.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	93.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,014	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	3,201	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	3,201	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-86.9				Rm Exh	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-33.19	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)
			ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall	Ceil.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	38.4	9.81
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.036	0.908	0.943	0.057	0.317	44.0	10.67
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	38.2	7.65
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	39.7	7.93
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	40.7	8.21
9	STAIRS	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	39.5	8.03
Building		0.275	0.000	0.000	0.000	0.037	0.909	0.944	0.088	0.317	40.9	9.56

BUILDING AREAS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed			Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
		Number of Duplicate Flr	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)			
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	16	17
5	NEW PRO SHOP	1	1	600	600	0	0	0	600	81	23
6	LOUNGE	1	1	1,308	1,308	0	0	0	1,312	307	30
Zone	2 Total/Ave.			2,297	0	0	0	0	1,912	404	27
8	OFFICE	1	1	145	145	0	0	0	0	0	0
Zone	4 Total/Ave.			145	0	0	0	0	0	0	0
System	1 Total/Ave.			2,442	0	0	0	0	1,912	404	27
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	16	17
5	NEW PRO SHOP	1	1	600	600	0	0	0	600	81	23
6	LOUNGE	1	1	1,308	1,308	0	0	0	1,312	307	30
Zone	2 Total/Ave.			2,297	0	0	0	0	1,912	404	27
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	775	53	8
Zone	3 Total/Ave.			775	0	0	0	0	775	53	8
System	2 Total/Ave.			3,072	0	0	0	0	2,687	457	21
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	14	3
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	1,000	17	4
3	LOCKER ROOM	1	1	714	714	374	0	0	0	14	11
Zone	1 Total/Ave.			2,450	374	0	0	0	1,000	45	4
9	STAIRS	1	1	169	169	0	0	0	169	0	0
Zone	5 Total/Ave.			169	0	0	0	0	169	0	0
System	3 Total/Ave.			2,619	374	0	0	0	1,169	45	4
Building				8,133	374	0	0	0	5,768	906	19
											3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.037 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.246 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.131 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.45 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 24.62 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	Cooling Load			Heating Load			Cooling Airflow			Heating Airflow		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.3	66	1,310	-19,666	12	303	322.4	0	0	0.0	0	0
5 - 10	0.6	1	15	-39,332	24	586	644.9	0	0	0.0	0	0
10 - 15	1.0	2	34	-58,997	22	549	967.3	0	0	0.0	0	0
15 - 20	1.3	1	15	-78,663	6	155	1,289.8	0	0	0.0	0	0
20 - 25	1.6	1	16	-98,329	3	63	1,612.2	0	0	0.0	0	0
25 - 30	1.9	1	15	-117,995	4	100	1,934.6	0	0	0.0	0	0
30 - 35	2.3	2	31	-137,660	4	87	2,257.1	0	0	0.0	0	0
35 - 40	2.6	1	15	-157,326	1	31	2,579.5	0	0	0.0	0	0
40 - 45	2.9	8	150	-176,992	2	60	2,902.0	0	0	0.0	0	0
45 - 50	3.2	5	109	-196,658	2	45	3,224.4	72	5,088	0.0	0	0
50 - 55	3.5	5	93	-216,324	4	95	3,546.8	28	1,989	0.0	0	0
55 - 60	3.9	3	62	-235,989	16	403	3,869.3	0	0	0.0	0	0
60 - 65	4.2	2	31	-255,655	0	0	4,191.7	0	0	0.0	0	0
65 - 70	4.5	5	93	-275,321	0	0	4,514.2	0	0	0.0	0	0
70 - 75	4.8	0	0	-294,987	0	0	4,836.6	0	0	0.0	0	0
75 - 80	5.2	0	0	-314,653	0	0	5,159.0	0	0	0.0	0	0
80 - 85	5.5	0	0	-334,318	0	0	5,481.5	0	0	0.0	0	0
85 - 90	5.8	0	0	-353,984	0	0	5,803.9	0	0	0.0	0	0
90 - 95	6.1	0	0	-373,650	0	0	6,126.4	0	0	0.0	0	0
95 - 100	6.4	0	0	-393,316	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,283	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2
WALL & ROOF INSULATION

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	2	4	2	3	1	5	Zone Number
Max. Temp.	80.4	316.5	106.1	111.2	104.9	166.5	
Mo./Hr.	7	23	12	24	8	19	8 19
Day Type	1	5	1	1	1	1	
							Number of Hours
Above 100	0	8,052	1,296	2,388	1,404	3,125	
95 - 100	0	28	1,205	540	1,368	67	
90 - 95	0	116	418	40	248	156	
85 - 90	0	104	255	184	176	108	
80 - 85	15	205	282	250	278	216	
75 - 80	2,794	136	216	304	198	0	
70 - 75	837	119	0	289	0	0	
65 - 70	26	0	2,252	2,310	2,777	5,088	
60 - 65	401	0	1,240	1,384	1,771	0	
55 - 60	956	0	753	803	540	0	
50 - 55	693	0	843	268	0	0	
Below 50	3,038	0	0	0	0	0	
Min. Temp.	31.2	68.0	54.9	55.0	57.2	67.6	
Mo./Hr.	2	8	1	1	24	1	5
Day Type	5	1	1	2	1	1	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	3,038	10	596
Feb	2,777	10	609
March	2,893	10	401
April	2,624	10	197
May	4,247	17	0
June	4,690	18	0
July	5,804	18	0
Aug	4,865	18	0
Sept	4,110	17	0
Oct	2,639	10	131
Nov	2,678	10	264
Dec	2,985	10	491
Total	43,350	18	2,689

Building Energy Consumption = 51,257 (Btu/Sq Ft/Year) Floor Area = 8,133 (Sq Ft)
Source Energy Consumption = 89,386 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2 WALL & ROOF INSULATION

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2
WALL & ROOF INSULATION

ELEC	84	80	63	35	0	0	0	0	0	26	43	76	408
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240 BOILER FORCED DRAFT FAN													
ELEC	117	112	88	49	0	0	0	0	0	37	60	106	569
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5307 BOILER CONTROLS													
ELEC	248	238	186	105	0	0	0	0	0	78	128	226	1,208
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040 FUEL OIL PUMP C.V.													
ELEC	131	126	98	56	0	0	0	0	0	41	68	119	639
PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Per cent Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00
Miscellaneous				
Lights			12.2	68.89
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			12.2	68.89
Grand Total			17.7	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 901

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	11:53:51 1/17/94
Dataset Name:	CB901 .TM

AIRFLOW - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	3,248	3,248	4,427	1,179	0	0
2 RAD		0	0	0	0	1,441	0	0
3 UH		0	0	3,201	0	936	0	0
Totals		0	3,248	6,449	4,427	3,557	0	0

CAPACITY - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						Heating Totals (Btuh)	
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	
1 SZ		7.2	0.0	0.0	7.2	-162,044	0	0	0	0	0	0	-162,044
2 RAD		0.0	0.0	0.0	0.0	-159,424	0	0	0	0	0	0	-159,424
3 UH		0.0	0.0	0.0	0.0	-89,278	0	0	0	0	0	0	-89,278
Totals		7.2	0.0	0.0	7.2	-410,745	0	0	0	0	0	0	-410,745

The building peaked at hour 15 month 7 with a capacity of 7.2 tons

ENGINEERING CHECKS - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft			
1 Main	SZ		0.00	1.33	451.3	339.3	35.36	1.33	-66.36			2,442
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-51.90			3,072
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.22	-34.09			2,619

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 7/15			*	Mo/Hr: 7/17			*	Mo/Hr: 13/ 1		
Outside Air ==>	OADB/WB/HR: 91/ 73/ 98.0			*	OADB: 89			*	OADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads				0	0.00	*	0	0.00	*	0	0.00
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	6,983	0		6,983	8.09	*	11,443	17.95	*	-14,585	-14,585 9.12
Glass Solar	8,427	0		8,427	9.76	*	10,885	17.07	*	0	0.00
Glass Cond	1,580	0		1,580	1.83	*	1,618	2.54	*	-7,855	-7,855 4.91
Wall Cond	6,730	27		6,756	7.82	*	10,410	16.33	*	-20,341	-20,455 12.79
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	46,260			46,260	53.57	*	18,558	29.11	*	-82,135	-82,135 51.37
Sub Total==>	69,979	27		70,005	81.07	*	52,914	82.99	*	-124,916	-125,029 78.19
Internal Loads						*			*		
Lights	11,334	0		11,334	13.12	*	8,954	14.04	*	0	0.00
People	4,560			4,560	5.28	*	1,791	2.81	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	15,893	0	0	15,893	18.40	*	10,745	16.85	*	0	0.00
Ceiling Load	222	-222		0	0.00	*	108	0.17	*	-467	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				462	0.53	*		0.00	*		0.00
Ret. Fan Heat				0	0.00	*		0.00	*		0.00
Duct Heat Pkup				0	0.00	*		0.00	*		0.00
OV/UNDR Sizing	-6			-6	-0.01	*	-6	-0.01	*	-34,866	-34,866 21.81
Exhaust Heat	0	0		0	0.00	*		0.00	*	0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*	0	0.00
Grand Total==>	86,088	-195	0	86,354	100.00	*	63,760	100.00	*	-160,248	-159,895 100.00

COOLING COIL SELECTION								AREAS					
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Floor		
Main Clg	7.2	86.4	57.6	3,248	75.2	63.9	73.1	56.8	55.1	63.6	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	1,912	0 0
Totals	7.2	86.4									Wall	1,489	404 27

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-162.0	3,248	67.5	113.3	Infil	1,179	1,179	Clg Cfm/Sqft	1.33	SADB	57.0	113.3
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,248	Clg Cfm/Ton	451.32	Plenum	76.8	64.2
Preheat	-0.0	3,248	67.5	56.8	MinCfm	0	0	Clg Sqft/Ton	339.35	Return	75.2	67.5
Reheat	0.0	0	0.0	0.0	Return	3,248	3,248	Clg Btuh/Sqft	35.36	Ret/OA	75.2	67.5
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	8	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-162.0				Auxil	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.0	0.0
							Htg Btuh/SqFt	-66.36	Fn Frict	0.1	0.0	

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 0/ 0			*	Mo/Hr: 0/ 0			*	Mo/Hr: 13/ 1		
Outside Air ==>	DADB/WB/HR: 0/ 0/ 0.0			*	DADB: 0			*	DADB: 4		
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads				0	0.00	*	0	0.00	*	0	0.00
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-17,425	10.93
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,887	5.57
Wall Cond	0	0		0	0.00	*	0	0.00	*	-32,718	20.55
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-100,356	62.95
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-159,387	100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,443	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat		0		0	0.00	*			0.00	*	0.00
Duct Heat Pkup		0		0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*	0.00
Terminal Bypass	0	0		0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-164,830	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Deg F	Leaving DB/WB/HR Grains	Deg F	Deg F	Leaving DB/WB/HR Grains	Gross Total	Glass (sf)	(\\$)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	Roof	2,687	0
Totals	0.0	0.0							Wall	2,177	457 21

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--			--TEMPERATURES (F)---		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-159.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,441	Clg Cfm/Ton	0.00	Plenum	0.0	23.8
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-159.4			Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0	
				Auxil	0	0	Htg Btuh/SqFt	-51.90	Fn Frict	0.0	0.0	

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 0 / 0			*	Mo/Hr: 0 / 0			*	Mo/Hr: 13 / 1		
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0			*	OADB: 0			*	OADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak Space Sens (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (\$)
Envelope Loads				0	0.00	*	0	0.00	*	0	0.00
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-3,002	3.36
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-871	0.98
Wall Cond	0	0		0	0.00	*	0	0.00	*	-20,183	22.61
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-65,222	73.06
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-89,278	100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	0.00
Ret. Fan Heat				0	0.00	*			0.00	*	0.00
Duct Heat Pkup				0	0.00	*			0.00	*	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*	0.00
Terminal Bypass	0	0		0	0.00	*			0.00	*	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-89,278	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Leaving DB/WB/HR	Deg F	Deg F	Gross Total	Glass (sf)	(%)	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Floor	2,619		
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	374		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0		
Totals	0.0	0.0						Roof	1,169	0	0
								Wall	1,043	45	4

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-89.3	3,201	68.0	93.6	Infil	0	936	0	Clg Cfm/Sqft	0.00	SADB	0.0 93.6
Aux Htg	0.0	0	0.0	0.0	Supply	0	3,201	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	3,201	Clg Btuh/Sqft	0.00	Ret/DA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-89.3				Auxil	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0
							Htg Btuh/SqFt	-34.09	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- BUILDING U-VALUES -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)	
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall			
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.300	0.304	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.300	0.304	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.300	0.304	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.300	0.304	0.295	0.317	37.7	9.72
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.300	0.304	0.295	0.317	36.3	9.30
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.300	0.304	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.300	0.304	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.300	0.304	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.300	0.304	0.295	0.317	37.7	9.72
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.057	0.300	0.304	0.304	0.000	53.0	11.38
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.300	0.304	0.304	0.000	53.0	11.38
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.101	0.300	0.304	0.298	0.317	41.6	10.13
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.300	0.304	0.304	0.000	36.7	7.35
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.300	0.304	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.300	0.304	0.304	0.000	39.3	7.86
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.300	0.304	0.316	0.000	40.1	8.10
9	STAIRS	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.040	0.300	0.304	0.316	0.000	38.9	7.91
Building		0.275	0.000	0.000	0.000	0.095	0.300	0.304	0.302	0.317	39.1	9.17

BUILDING AREAS - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed			Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Number of Duplicate Flr	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)			
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	16	17
5	NEW PRO SHOP	1	1	600	600	0	0	0	600	81	23
6	LOUNGE	1	1	1,308	1,308	0	0	0	1,312	307	30
Zone	2 Total/Ave.			2,297	0	0	0	0	1,912	404	27
8	OFFICE	1	1	145	145	0	0	0	0	0	0
Zone	4 Total/Ave.			145	0	0	0	0	0	0	0
System	1 Total/Ave.			2,442	0	0	0	0	1,912	404	27
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	16	17
5	NEW PRO SHOP	1	1	600	600	0	0	0	600	81	23
6	LOUNGE	1	1	1,308	1,308	0	0	0	1,312	307	30
Zone	2 Total/Ave.			2,297	0	0	0	0	1,912	404	27
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	775	53	8
Zone	3 Total/Ave.			775	0	0	0	0	775	53	8
System	2 Total/Ave.			3,072	0	0	0	0	2,687	457	21
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	14	3
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	1,000	17	4
3	LOCKER ROOM	1	1	714	714	374	0	0	0	14	11
Zone	1 Total/Ave.			2,450	374	0	0	0	1,000	45	4
9	STAIRS	1	1	169	169	0	0	0	169	0	0
Zone	5 Total/Ave.			169	0	0	0	0	169	0	0
System	3 Total/Ave.			2,619	374	0	0	0	1,169	45	4
Building				8,133	374	0	0	0	5,768	906	19
											3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.095 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.302 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.188 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.77 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 23.77 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	58	1,159	-20,537	14	330	322.4	0	0	0.0	0	0
5 - 10	0.7	3	60	-41,075	19	463	644.9	0	0	0.0	0	0
10 - 15	1.1	2	49	-61,612	26	630	967.3	0	0	0.0	0	0
15 - 20	1.4	3	54	-82,149	5	119	1,289.8	0	0	0.0	0	0
20 - 25	1.8	2	31	-102,686	4	87	1,612.2	0	0	0.0	0	0
25 - 30	2.2	2	37	-123,224	4	106	1,934.6	0	0	0.0	0	0
30 - 35	2.5	2	31	-143,761	2	59	2,257.1	0	0	0.0	0	0
35 - 40	2.9	0	0	-164,298	2	44	2,579.5	0	0	0.0	0	0
40 - 45	3.2	3	61	-184,835	1	31	2,902.0	0	0	0.0	0	0
45 - 50	3.6	12	229	-205,373	1	31	3,224.4	72	5,088	0.0	0	0
50 - 55	4.0	3	61	-225,910	3	61	3,546.8	28	1,989	0.0	0	0
55 - 60	4.3	3	62	-246,447	2	59	3,869.3	0	0	0.0	0	0
60 - 65	4.7	6	124	-266,985	15	361	4,191.7	0	0	0.0	0	0
65 - 70	5.0	2	31	-287,522	0	0	4,514.2	0	0	0.0	0	0
70 - 75	5.4	0	0	-308,059	0	0	4,836.6	0	0	0.0	0	0
75 - 80	5.8	0	0	-328,596	0	0	5,159.0	0	0	0.0	0	0
80 - 85	6.1	0	0	-349,134	0	0	5,481.5	0	0	0.0	0	0
85 - 90	6.5	0	0	-369,671	0	0	5,803.9	0	0	0.0	0	0
90 - 95	6.8	0	0	-390,208	0	0	6,126.4	0	0	0.0	0	0
95 - 100	7.2	0	0	-410,745	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,379	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	2	4	2	3	1	5	Zone Number
Max. Temp.	81.7	316.5	108.3	101.2	102.2	141.3	
Mo./Hr.	7	24	12	24	8	21	8 20
Day Type	1	5	1	1	1	1	1
							Number of Hours
Above 100	0	8,052	1,698	90	438	3,089	
95 - 100	0	28	954	1,113	1,496	99	
90 - 95	0	116	364	1,249	948	196	
85 - 90	0	104	352	526	346	90	
80 - 85	91	205	304	568	318	198	
75 - 80	2,836	136	0	126	126	0	
70 - 75	745	119	0	34	0	0	
65 - 70	34	0	2,481	2,560	2,810	5,088	
60 - 65	713	0	1,106	1,313	1,707	0	
55 - 60	859	0	705	696	571	0	
50 - 55	619	0	796	485	0	0	
Below 50	2,863	0	0	0	0	0	
Min. Temp.	32.3	68.0	54.9	55.0	57.2	67.3	
Mo./Hr.	2	9	1	1	6	1	8
Day Type	5	1	1	1	1	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	3,035	10	600
Feb	2,757	10	600
March	2,844	10	387
April	2,630	10	185
May	4,274	17	0
June	4,869	18	0
July	6,041	18	0
Aug	5,051	18	0
Sept	4,155	17	0
Oct	2,644	10	130
Nov	2,630	10	261
Dec	2,998	10	495
Total	43,928	18	2,658

Building Energy Consumption = 51,110 (Btu/Sq Ft/Year)
Source Energy Consumption = 89,704 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3 DOUBLE GLAZED WINDOWS

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

	ELEC	81	76	54	35	0	0	0	0	26	35	76	385
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240 BOILER FORCED DRAFT FAN													
	ELEC	120	111	80	52	0	0	0	0	39	52	112	567
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5307 BOILER CONTROLS													
	ELEC	241	224	161	105	0	0	0	0	78	105	226	1,139
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040 FUEL OIL PUMP C.V.													
	ELEC	135	125	90	59	0	0	0	0	43	59	126	636
	PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3
DOUBLE GLAZED WINDOWS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp.	Ref.	Equipment	Utility Demand (kW)	Percent Of Tot (%)
Ref.	Num.	Code Name	Equipment Description	

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights		12.2	68.89
Base Utilities		0.0	0.00
Misc Equipment		0.0	0.00
Sub Total		12.2	68.89
Grand Total		17.7	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 901

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	12: 7:27 1/17/94
Dataset Name:	C8901.TM

AIRFLOW - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	3,248	3,248	4,183	935	0	0
2 RAD		0	0	0	0	1,142	0	0
3 UH		0	0	3,201	0	743	0	0
Totals		0	3,248	6,449	4,183	2,821	0	0

CAPACITY - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating							
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Capacity (Btuh)	Vent. Capacity (Btuh)
1 SZ		7.3	0.0	0.0	0.0	7.3	-160,656	0	0	0	0	0	0	-160,656
2 RAD		0.0	0.0	0.0	0.0	0.0	-157,314	0	0	0	0	0	0	-157,314
3 UH		0.0	0.0	0.0	0.0	0.0	-77,346	0	0	0	0	0	0	-77,346
Totals		7.3	0.0	0.0	0.0	7.3	-395,317	0	0	0	0	0	0	-395,317

The building peaked at hour 15 month 7 with a capacity of 7.3 tons

ENGINEERING CHECKS - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft			
1 Main	SZ		0.00	1.33	445.0	334.6	35.86	1.33	-65.79			2,442
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-51.21			3,072
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.22	-29.53			2,619

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****												
Peaked at Time ==>	Mo/Hr: 7/15			*	Mo/Hr: 7/17			*	Mo/Hr: 13/1			
Outside Air ==>	OADB/WB/HR: 91/ 73/ 98.0			*	OADB: 89			*	OADB: 4			
	Space Sens. Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	*	Space Peak (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	8,730	0		8,730	9.97	*	11,443	17.08	*	-14,585	-14,585	9.20
Glass Solar	13,082	0		13,082	14.94	*	14,618	21.82	*	0	0	0.00
Glass Cond	5,137	0		5,137	5.87	*	4,960	7.40	*	-24,753	-24,753	15.62
Wall Cond	8,189	26		8,215	9.38	*	10,410	15.54	*	-20,341	-20,455	12.90
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	35,860			35,860	40.95	*	14,718	21.97	*	-65,148	-65,148	41.10
Sub Total==>	70,998	26		71,024	81.10	*	56,150	83.82	*	-124,827	-124,940	78.82
Internal Loads						*			*			
Lights	11,498	0		11,498	13.13	*	8,954	13.37	*	0	0	0.00
People	4,597			4,597	5.25	*	1,791	2.67	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	16,095	0	0	16,095	18.38	*	10,745	16.04	*	0	0	0.00
Ceiling Load	277	-277		0	0.00	*	103	0.15	*	-467	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.53	*		0.00	*		0	0.00
Ret. Fan Heat				0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup				0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-6			-6	-0.01	*	-6	-0.01	*	-33,568	-33,568	21.18
Exhaust Heat	0	0		0	0.00	*		0.00	*	0	0	0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*	0	0	0.00
Grand Total==>	87,364	-252	0	87,574	100.00	*	66,992	100.00	*	-158,861	-158,508	100.00

COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	7.3	87.6	65.6	3,248	75.3	63.0	68.6	55.9	53.8	60.0		Floor	2,442	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		Part	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0		ExFlr	0	
Totals	7.3	87.6										Roof	1,912	0
												Wall	1,489	404
														27

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Vent	Heating 0	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-160.7	3,248	67.5	113.0	Infil	935	935	Clg Cfm/Sqft	1.33	SADB	56.0	113.0
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,248	Clg Cfm/Ton	445.03	Plenum	77.2	64.2
Preheat	-0.0	3,248	67.5	55.9	Mincfm	0	0	Clg Sqft/Ton	334.62	Return	75.3	67.5
Reheat	0.0	0	0.0	0.0	Return	3,248	3,248	Clg Btuh/Sqft	35.86	Ret/OA	75.3	67.5
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	8	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-160.7				Auxil	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-65.79	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK *****						CLG SPACE PEAK *****			HEATING COIL PEAK *****		
Peaked at Time ==>	Mo/Hr: 0 / 0		*	Mo/Hr: 0 / 0	*	Mo/Hr: 13 / 1					
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0		*	OADB: 0	*	OADB: 4					
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads				0	0.00	*	0	0.00	*	0	0.00
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-17,425	-17,425 11.08
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600 17.54
Wall Cond	0	0		0	0.00	*	0	0.00	*	-32,718	-32,756 20.82
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-79,534	-79,534 50.56
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-157,277	-157,314 100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,443	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00		0.00
Ret. Fan Heat				0	0.00	*			0.00		0.00
Duct Heat Pkup				0	0.00	*			0.00		0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00		0.00
Terminal Bypass	0	0		0	0.00	*			0.00		0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-162,720	-157,314 100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	2,687	0 0
Totals	0.0	0.0										Wall	2,177	457 21

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-157.3	0	0.0	0.0	Infil	0	1,142	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	23.8
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-157.3				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-51.21	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****												
Peaked at Time ==>	Mo/Hr: 0 / 0			*	Mo/Hr: 0 / 0			*	Mo/Hr: 13 / 1			
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0			*	OADB: 0			*	OADB: 4			
	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	*	Space Peak (Btuh)	Coil Peak (Btuh)	Percent (%)
Envelope Loads				0	0.00	*	0	0.00	*	0	0	0.00
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-3,002	-3,002	3.88
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-2,402	-2,402	3.11
Wall Cond	0	0		0	0.00	*	0	0.00	*	-20,183	-20,183	26.09
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-51,760	-51,760	66.92
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-77,346	-77,346	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*		
Ret. Fan Heat				0	0.00	*			0.00	*		
Duct Heat Pkup				0	0.00	*			0.00	*		
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*		
Terminal Bypass	0	0		0	0.00	*			0.00	*		
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-77,346	-77,346	100.00

COOLING COIL SELECTION								AREAS			
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Gross Total Floor	Glass (sf)	(%)				
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	Part	374		
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	Roof	1,169	0	0
Totals	0.0	0.0				1,043	45	Wall			

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-77.3	3,201	68.0	90.2	Infil	0	743	0	Clg Cfm/Sqft	0.00	SADB	0.0 90.2
Aux Htg	0.0	0	0.0	0.0	Supply	0	3,201	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	3,201	Clg Btuh/Sqft	0.00	Ret/0A	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-77.3				Auxil	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0
						0	Htg Btuh/SqFt	-29.53	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- BUILDING U-VALUES -----

Room U-Values											Room	Room	
											Mass	Capac.	
Room	Number	Description	Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall	Ceil.	(lb/sqft)	(Btu/sqft/F)
	4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27
	5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15
	6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59
Zone	2	Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72
	8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4	Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1	Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	36.3	9.30
	4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27
	5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15
	6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59
Zone	2	Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72
	7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38
Zone	3	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38
System	2	Total/Ave.	0.000	0.000	0.000	0.000	0.101	0.908	0.943	0.298	0.317	41.6	10.13
	1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	36.7	7.35
	2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
	3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	39.3	7.86
Zone	1	Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.316	0.000	40.1	8.10
	9	STAIRS	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
Zone	5	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
System	3	Total/Ave.	0.275	0.000	0.000	0.000	0.040	0.810	0.837	0.316	0.000	38.9	7.91
Building			0.275	0.000	0.000	0.000	0.095	0.909	0.944	0.302	0.317	39.1	9.17

BUILDING AREAS - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed		Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Duplicate Flr	Room Rm	Area/Dupl (sqft)	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)						
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.				145	0	0	0	0	0	0	0	0
System	1 Total/Ave.				2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.				775	0	0	0	0	775	53	8	635
System	2 Total/Ave.				3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.				2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.				169	0	0	0	0	169	0	0	0
System	3 Total/Ave.				2,619	374	0	0	0	1,169	45	4	998
Building					8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.095 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.419 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.240 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.77 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 31.23 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.4	57	1,125	-19,766	13	304	322.4	0	0	0.0	0	0
5 - 10	0.7	3	65	-39,532	18	440	644.9	0	0	0.0	0	0
10 - 15	1.1	2	47	-59,298	25	592	967.3	0	0	0.0	0	0
15 - 20	1.5	0	0	-79,063	8	189	1,289.8	0	0	0.0	0	0
20 - 25	1.8	4	86	-98,829	5	120	1,612.2	0	0	0.0	0	0
25 - 30	2.2	2	30	-118,595	5	118	1,934.6	0	0	0.0	0	0
30 - 35	2.6	0	0	-138,361	1	31	2,257.1	0	0	0.0	0	0
35 - 40	2.9	3	68	-158,127	1	16	2,579.5	0	0	0.0	0	0
40 - 45	3.3	2	43	-177,893	1	28	2,902.0	0	0	0.0	0	0
45 - 50	3.6	7	147	-197,659	3	62	3,224.4	72	5,088	0.0	0	0
50 - 55	4.0	8	161	-217,424	3	61	3,546.8	28	1,989	0.0	0	0
55 - 60	4.4	2	31	-237,190	18	420	3,869.3	0	0	0.0	0	0
60 - 65	4.7	8	155	-256,956	0	0	4,191.7	0	0	0.0	0	0
65 - 70	5.1	2	31	-276,722	0	0	4,514.2	0	0	0.0	0	0
70 - 75	5.5	0	0	-296,488	0	0	4,836.6	0	0	0.0	0	0
75 - 80	5.8	0	0	-316,254	0	0	5,159.0	0	0	0.0	0	0
80 - 85	6.2	0	0	-336,020	0	0	5,481.5	0	0	0.0	0	0
85 - 90	6.6	0	0	-355,786	0	0	5,803.9	0	0	0.0	0	0
90 - 95	6.9	0	0	-375,551	0	0	6,126.4	0	0	0.0	0	0
95 - 100	7.3	0	0	-395,317	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,379	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	2	4	2	3	1	5	Zone Number
Max. Temp.	82.0	316.5	102.7	99.8	101.3	141.3	
Mo./Hr.	7	24	12	24	7	22	7 21
Day Type	1	5	1	1	1	1	1
							Number of Hours
Above 100	0	8,052	160	0	280	3,089	
95 - 100	0	28	1,034	812	1,454	99	
90 - 95	0	116	1,054	1,226	1,036	196	
85 - 90	0	104	763	766	412	90	
80 - 85	156	205	643	724	382	198	
75 - 80	2,800	136	18	144	108	0	
70 - 75	716	119	0	34	0	0	
65 - 70	51	0	2,437	2,580	3,070	5,088	
60 - 65	731	0	1,139	1,265	1,709	0	
55 - 60	824	0	721	764	309	0	
50 - 55	661	0	791	445	0	0	
Below 50	2,821	0	0	0	0	0	
Min. Temp.	32.1	68.0	54.9	54.9	58.4	67.3	
Mo./Hr.	2	9	1	1	12	5	2 3 2 7 1 6
Day Type	5	1	1	3	1	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	3,037	10	577
Feb	2,757	10	573
March	2,834	10	365
April	2,624	10	170
May	4,321	17	0
June	4,952	18	0
July	6,099	18	0
Aug	5,093	18	0
Sept	4,180	17	0
Oct	2,639	10	130
Nov	2,624	10	251
Dec	2,965	10	482
Total	44,125	18	2,548

Building Energy Consumption = 49,844 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

Source Energy Consumption = 88,533 (Btu/Sq Ft/Year)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

ELEC	84	78	54	35	0	0	0	0	0	26	35	73	387
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240 BOILER FORCED DRAFT FAN													
ELEC	116	108	76	49	0	0	0	0	0	36	49	102	537
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5307 BOILER CONTROLS													
ELEC	248	230	161	105	0	0	0	0	0	78	105	217	1,144
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040 FUEL OIL PUMP C.V.													
ELEC	131	121	85	55	0	0	0	0	0	41	55	114	603
PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights	12.2	68.89
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	12.2	68.89
Grand Total	17.7	100.00

**
** TRACE 600 ANALYSIS **
**
** by **
**

ENERGY SAVINGS OPPORTUNITY STUDY
CARLISLE BARRACKS, PA
DEPARTMENT OF THE ARMY
BENATEC ASSOCIATES
BUILDING 901

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Reflectance:	0.20
Winter Ground Reflectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	13: 6: 8 1/17/94
Dataset Name:	CB901B .TM

AIRFLOW - ALTERNATIVE 1
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 SZ		0	3,248	3,248	3,965	717	0	0
2 RAD		0	0	0	0	875	0	0
3 UH		0	0	3,201	0	569	0	0
Totals		0	3,248	6,449	3,965	2,161	0	0

CAPACITY - ALTERNATIVE 1
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating								
		Main Sys. Capacity (Tons)	Aux. Capacity (Tons)	Sys. Capacity (Tons)	Opt. Capacity (Tons)	Vent. Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent. Capacity (Btuh)	Heating Totals (Btuh)
1 SZ		4.9	0.0	0.0	4.9	0.0	4.9	-106,192	0	0	0	0	0	-106,192
2 RAD		0.0	0.0	0.0	0.0	0.0	0.0	-101,019	0	0	0	0	0	-101,019
3 UH		0.0	0.0	0.0	0.0	0.0	0.0	-55,994	0	0	0	0	0	-55,994
Totals		4.9	0.0	0.0	4.9	0.0	4.9	-263,205	0	0	0	0	0	-263,205

The building peaked at hour 14 month 7 with a capacity of 4.9 tons

ENGINEERING CHECKS - ALTERNATIVE 1
COMBINED ECOS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating				Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft /Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft			
1 Main	SZ		0.00	1.33	657.2	494.1	24.29	1.33	-43.49			2,442
2 Main	RAD		0.00	0.00	0.0	0.0	0.00	0.00	-32.88			3,072
3 Main	UH		0.00	0.00	0.0	0.0	0.00	1.22	-21.38			2,619

System 1 Peak SZ - SINGLE ZONE

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 7/14 * Mo/Hr: 7/15 * Mo/Hr: 13/1
 Outside Air ==> OADB/WB/HR: 91/74/105.0 * OADB: 91 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*					
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	1,640	0		1,640	2.77	*	1,994	4.21	*	-4,646	-4,646 4.41
Glass Solar	11,853	0		11,853	19.99	*	13,082	27.63	*	0	0 0.00
Glass Cond	4,849	0		4,849	8.18	*	5,137	10.85	*	-24,753	-24,753 23.47
Wall Cond	887	6		893	1.51	*	1,059	2.24	*	-3,889	-3,914 3.71
Partition	0			0	0.00	*	0	0.00	*	0	0 0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0 0.00
Infiltration	23,717			23,717	39.99	*	12,481	26.36	*	-49,923	-49,923 47.34
Sub Total==>	42,946	6		42,951	72.42	*	33,752	71.28	*	-83,211	-83,236 78.93
Internal Loads						*			*		
Lights	11,334	0		11,334	19.11	*	11,431	24.14	*	0	0 0.00
People	4,560			4,560	7.69	*	2,141	4.52	*	0	0 0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sub Total==>	15,893	0	0	15,893	26.80	*	13,573	28.66	*	0	0 0.00
Ceiling Load	54	-54		0	0.00	*	26	0.05	*	-154	0 0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0 0.00
Sup. Fan Heat				462	0.78	*		0.00	*		0 0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0 0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0 0.00
OV/UNDR Sizing	0			0	-0.00	*	0	-0.00	*	-22,222	-22,222 21.07
Exhaust Heat	0	0		0	0.00	*		0.00	*	0	0 0.00
Terminal Bypass	0	0		0	0.00	*		0.00	*	0	0 0.00
Grand Total==>	58,893	-49	0	59,306	100.00	*	47,351	100.00	*	-105,587	-105,458 100.00

COOLING COIL SELECTION

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
Main Clg	4.9	59.3	45.2	3,248	75.1 65.6 81.6	61.5 59.9 76.7	Floor Part	2,442 0
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	1,912 0 0
Totals	4.9	59.3					Wall	1,489 404 27

HEATING COIL SELECTION

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg
Main Htg	-106.2	3,248	67.8	97.9	Infil	717	717	Clg Cfm/Sqft	1.33	SADB	61.6	97.9
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,248	Clg Cfm/Ton	657.15	Plenum	75.4	66.7
Preheat	-0.0	3,248	67.8	61.5	Mincfm	0	0	Clg Sqft/Ton	494.11	Return	75.1	67.8
Reheat	0.0	0	0.0	0.0	Return	3,248	3,248	Clg Btuh/Sqft	24.29	Ret/DA	75.1	67.8
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	8	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-106.2				Auxil	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-43.49	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
 Peaked at Time ==> Mo/Hr: 0 / 0 * Mo/Hr: 0 / 0 * Mo/Hr: 13 / 1
 Outside Air ==> OADB/WB/HR: 0 / 0 / 0.0 * OADB: 0 * OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent (%)	*	Space Sensible (Btuh)	Percent (%)	*	Space Peak (Btuh)	Coil Peak Tot Sens (Btuh)	Percent (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-6,257	-6,257	6.19
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	27.32
Wall Cond	0	0		0	0.00	*	0	0.00	*	-6,197	-6,211	6.15
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-60,952	-60,952	60.34
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-101,005	-101,019	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-3,497	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			*			
Ret. Fan Heat				0	0.00	*			*			
Duct Heat Pkup				0	0.00	*			*			
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0		0	0.00	*			*			
Terminal Bypass	0	0		0	0.00	*			*			
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-104,502	-101,019	100.00

COOLING COIL SELECTION							AREAS				
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Floor	3,072	Glass (sf)	(%)		
Main Clg	0.0	0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	Part	0				
Aux Clg	0.0	0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	ExFlr	0				
Opt Vent	0.0	0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	Roof	2,687	0	0		
Totals	0.0	0.0				Wall	2,177	457	21		

HEATING COIL SELECTION				AIRFLOWS (cfm)			--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-101.0	0	0.0	Infil	0	875	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	39.6
Preheat	0.0	0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-101.0			Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
							Htg Btuh/SqFt	-32.88	Fn Fric	0.0	0.0

System 3 Block UH - UNIT HEATERS

***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****											
Peaked at Time ==>	Mo/Hr: 0 / 0			*	Mo/Hr: 0 / 0			*	Mo/Hr: 13 / 1		
Outside Air ==>	OADB/WB/HR: 0 / 0 / 0.0			*	OADB: 0			*	OADB: 4		
	Space Sens.+Lat. (Btu/h)	Ret. Air Sensible (Btu/h)	Ret. Air Latent (Btu/h)	Net Total (Btu/h)	Percent Of Tot (%)	*	Space Sensible (Btu/h)	Percent Of Tot (%)	Space Peak (Btu/h)	Coil Peak Tot Sens (Btu/h)	Percent Of Tot (%)
Envelope Loads				0	0.00	*	0	0.00	*	0	0.00
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-2,734	4.88
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-2,402	4.29
Wall Cond	0	0		0	0.00	*	0	0.00	*	-11,197	20.00
Partition	0			0	0.00	*	0	0.00	*	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-39,661	70.83
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-55,994	100.00
Internal Loads						*			*		
Lights	0	0		0	0.00	*	0	0.00	*	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0.00
Sup. Fan Heat				0	0.00	*			0.00	*	
Ret. Fan Heat		0		0	0.00	*			0.00	*	
Duct Heat Pkup		0		0	0.00	*			0.00	*	
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0.00
Exhaust Heat	0	0		0	0.00	*			0.00	*	
Terminal Bypass	0	0		0	0.00	*			0.00	*	
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-55,994	100.00

COOLING COIL SELECTION								AREAS					
Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR	Deg F	Deg F	Grains	Leaving DB/WB/HR	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	374	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	1,169	0
Totals	0.0	0.0									Wall	1,043	45

HEATING COIL SELECTION				AIRFLOWS (cfm)			ENGINEERING CHECKS--		TEMPERATURES (F)---			
Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-56.0	3,201	68.0	84.1	Infil	0	569	Clg Cfm/Ton	0.00	SADB	0.0	84.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	3,201	Clg Sqft/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	MinCfm	0	0	Clg Btuh/Sqft	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	3,201	No. People	0	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	1.22	Fn MtrTD	0.0	0.0
Total	-56.0				Auxil	0	0	Htg Btuh/SqFt	-21.38	Fn BldTD	0.0	0.0
								Htg Frict	0.0	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 1
COMBINED ECOS

----- BUILDING U-VALUES -----

Room Number	Description	Part.	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/sqft)	Room Capac. (Btu/sqft/F)
			Summr ExFlr	Wintr Skylt	Summr Skylt	Wintr Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	38.4	9.81
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.036	0.908	0.943	0.057	0.317	44.0	10.67
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	38.2	7.65
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	39.7	7.93
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	40.7	8.21
9	STAIRS	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	39.5	8.03
Building		0.275	0.000	0.000	0.000	0.037	0.909	0.944	0.088	0.317	40.9	9.56

BUILDING AREAS - ALTERNATIVE 1
COMBINED ECOS

----- BUILDING AREAS -----

Room Number	Description	Floor		Total		Exposed			Window Area (sqft)	Win Area (#)	Net Wall Area (sqft)	
		Number of Duplicate Flr	Area/Dupl Rm	Floor Area (sqft)	Partition Area (sqft)	Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)				
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.			2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0
Zone	4 Total/Ave.			145	0	0	0	0	0	0	0	0
System	1 Total/Ave.			2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.			2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	775	53	8	635
Zone	3 Total/Ave.			775	0	0	0	0	775	53	8	635
System	2 Total/Ave.			3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	14	11	114
Zone	1 Total/Ave.			2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	169	0	0	0
Zone	5 Total/Ave.			169	0	0	0	0	169	0	0	0
System	3 Total/Ave.			2,619	374	0	0	0	1,169	45	4	998
Building				8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 1
COMBINED ECOS

----- ASHRAE 90 ANALYSIS -----

Overall Roof U-Value = 0.037 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.246 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.131 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.45 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 24.62 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			---- Heating Load -----			---- Cooling Airflow -----			---- Heating Airflow -----		
	Cap. (Ton)	Hours (%)		Capacity (Btuh)	Hours (%)		Cap. (Cfm)	Hours (%)		Cap. (Cfm)	Hours (%)	
0 - 5	0.2	50	988	-13,160	17	330	322.4	0	0	0.0	0	0
5 - 10	0.5	0	0	-26,321	14	269	644.9	0	0	0.0	0	0
10 - 15	0.7	3	62	-39,481	16	309	967.3	0	0	0.0	0	0
15 - 20	1.0	3	61	-52,641	5	104	1,289.8	0	0	0.0	0	0
20 - 25	1.2	5	95	-65,801	6	125	1,612.2	0	0	0.0	0	0
25 - 30	1.5	2	31	-78,962	2	43	1,934.6	0	0	0.0	0	0
30 - 35	1.7	2	42	-92,122	0	0	2,257.1	0	0	0.0	0	0
35 - 40	2.0	3	50	-105,282	0	0	2,579.5	0	0	0.0	0	0
40 - 45	2.2	3	61	-118,442	10	196	2,902.0	0	0	0.0	0	0
45 - 50	2.5	12	245	-131,603	4	68	3,224.4	72	5,088	0.0	0	0
50 - 55	2.7	3	60	-144,763	5	97	3,546.8	28	1,989	0.0	0	0
55 - 60	3.0	6	124	-157,923	20	389	3,869.3	0	0	0.0	0	0
60 - 65	3.2	4	77	-171,083	0	0	4,191.7	0	0	0.0	0	0
65 - 70	3.5	2	31	-184,244	0	0	4,514.2	0	0	0.0	0	0
70 - 75	3.7	3	62	-197,404	0	0	4,836.6	0	0	0.0	0	0
75 - 80	4.0	0	0	-210,564	0	0	5,159.0	0	0	0.0	0	0
80 - 85	4.2	0	0	-223,724	0	0	5,481.5	0	0	0.0	0	0
85 - 90	4.4	0	0	-236,885	0	0	5,803.9	0	0	0.0	0	0
90 - 95	4.7	0	0	-250,045	0	0	6,126.4	0	0	0.0	0	0
95 - 100	4.9	0	0	-263,205	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,830	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	2	4	2	3	1	5	Zone Number
Max. Temp.	80.5	316.5	106.1	111.2	104.9	166.5	
Mo./Hr.	7	24	12	24	8	19	8
Day Type	1	5	1	1	1	1	1
							Number of Hours
Above 100	0	8,052	1,304	2,392	1,404	3,125	
95 - 100	0	28	1,197	536	1,368	67	
90 - 95	0	116	418	44	257	156	
85 - 90	0	104	341	208	167	108	
80 - 85	30	205	268	325	296	216	
75 - 80	3,093	136	144	579	180	0	
70 - 75	549	119	51	102	0	0	
65 - 70	170	0	2,496	2,549	3,540	5,088	
60 - 65	692	0	1,344	1,462	1,548	0	
55 - 60	861	0	780	563	0	0	
50 - 55	461	0	417	0	0	0	
Below 50	2,904	0	0	0	0	0	
Min. Temp.	33.6	68.0	54.9	55.4	60.6	67.6	
Mo./Hr.	2	8	1	1	4	2	8
Day Type	5	1	2	5	1	1	1

Trane Air Conditioning Economics
By: Trane Customer Direct Service Network

V 600
PAGE 10

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	2,862	10	383
Feb	2,597	10	382
March	2,707	10	244
April	2,529	10	101
May	4,317	17	0
June	4,786	18	0
July	5,658	18	0
Aug	4,930	18	0
Sept	4,186	17	0
Oct	2,582	10	53
Nov	2,559	10	163
Dec	2,817	10	318
Total	42,532	18	1,644

Building Energy Consumption = 38,057 (Btu/Sq Ft/Year)
Source Energy Consumption = 74,823 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
COMBINED ECOS

EQUIPMENT ENERGY CONSUMPTION

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1
COMBINED ECOS

	ELEC	68	64	42	25	0	0	0	0	0	21	30	61	311
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240 BOILER FORCED DRAFT FAN														
	ELEC	63	59	39	24	0	0	0	0	0	19	28	56	289
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5307 BOILER CONTROLS														
	ELEC	201	188	124	75	0	0	0	0	0	62	90	179	920
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040 FUEL OIL PUMP C.V.														
	ELEC	71	66	44	26	0	0	0	0	0	22	32	63	324
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights	12.2	68.89
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	12.2	68.89
Grand Total	17.7	100.00